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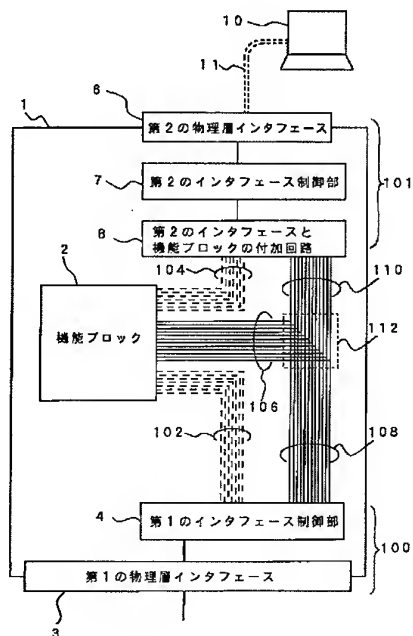
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(54) 【発明の名称】 P Cカード

(57) 【要約】

【課題】本発明は、各種情報を処理するパーソナルコンピュータやデジタルスチルカメラをはじめとする情報処理装置に着脱可能に装着されて使用されるP Cカードに関し、P Cカードが本来有している着脱容易で汎用性、携帯性に優れている利点を損なうことなく複数の情報処理装置と接続可能なP Cカードを提供することを目的とする。

【解決手段】情報処理装置に対して所定の機能を提供する機能ブロック2と携帯用P C (図示せず) との間でデータ転送を行う第1のインターフェース部100と、第1のインターフェース部100と異なるインターフェース仕様を有し、機能ブロック2とデスクトップ型P C 10との間でデータ転送を行う第2のインターフェース部101とを備えるように構成する。



## 【特許請求の範囲】

【請求項 1】 情報処理装置に対して所定の機能を提供する機能ブロックと、

前記機能ブロックと第 1 の情報処理装置との間でデータ転送を行う第 1 のインターフェース部と、

前記第 1 のインターフェース部と異なるインターフェース仕様を有し、前記機能ブロックと第 2 の情報処理装置との間でデータ転送を行う第 2 のインターフェース部とを少なくとも備えていることを特徴とする P C カード。

【請求項 2】 請求項 1 記載の P C カードであって、前記第 1 のインターフェース部は、前記第 1 の情報処理装置と物理的に接続する第 1 の物理層インターフェースと、前記第 1 の物理層インターフェースと前記機能ブロックとの間に設けられた第 1 のインターフェース制御部とを有していることを特徴とする P C カード。

【請求項 3】 請求項 2 記載の P C カードであって、前記第 1 のインターフェース部は、前記第 1 の情報処理装置と前記機能ブロックとの間で、前記第 1 のインターフェース制御部を介した制御手順を実現するための第 1 の付加回路を有していることを特徴とする P C カード。

【請求項 4】 請求項 3 記載の P C カードであって、前記第 1 の付加回路は、前記機能ブロックと前記第 1 のインターフェース制御部との間に設けられていることを特徴とする P C カード。

【請求項 5】 請求項 1 乃至 4 のいずれかに記載の P C カードであって、前記第 2 のインターフェース部は、前記第 2 の情報処理装置と物理的に接続する第 2 の物理層インターフェースと、前記第 2 の物理層インターフェースと前記機能ブロックとの間に設けられた第 2 のインターフェース制御部とを有していることを特徴とする P C カード。

【請求項 6】 請求項 5 記載の P C カードであって、前記第 2 のインターフェース部は、前記第 2 の情報処理装置と前記機能ブロックとの間で、前記第 2 のインターフェース制御部を介した制御手順を実現するための第 2 の付加回路を有していることを特徴とする P C カード。

【請求項 7】 請求項 6 記載の P C カードであって、前記第 2 の付加回路は、前記機能ブロックと前記第 2 のインターフェース制御部との間に設けられていることを特徴とする P C カード。

【請求項 8】 請求項 1 乃至 7 のいずれかに記載の P C カードであって、前記機能ブロックから前記第 1 及び第 2 のインターフェース部へ複数の信号線が接続され、前記複数の信号線の少なくとも一部は、共通信号線として分岐部を介して前記第 1 のインターフェース部と接続する第 1 の信号線

と、前記第 2 のインターフェース部と接続する第 2 の信号線との双方に接続されていることを特徴とする P C カード。

【請求項 9】 請求項 8 記載の P C カードであって、前記共通信号線は、前記第 1 及び第 2 の情報処理装置と前記機能ブロックとの間で転送されるべきデータ信号、アドレス信号あるいはコマンド信号のうちの少なくとも 1 つの信号が流れるバスラインであることを特徴とする P C カード。

10 【請求項 10】 請求項 8 又は 9 に記載の P C カードであって、前記第 1 及び第 2 のインターフェース部のいずれか一方を選択して前記機能ブロックに接続する切替手段を有することを特徴とする P C カード。

【請求項 11】 請求項 10 記載の P C カードであって、前記切替手段は、前記共通信号線を前記第 1 の信号線と第 2 の信号線のいずれか一方のみと電気的に接続させる信号線切替部を有していることを特徴とする P C カード。

20 【請求項 12】 請求項 11 記載の P C カードであって、前記信号線切替部は、前記第 1 の情報処理装置から前記第 1 のインターフェース部に供給される第 1 の電源電圧と、前記第 2 の情報処理装置から前記第 2 のインターフェース部に供給される第 2 の電源電圧とに基づいて、前記共通信号線を前記第 1 の信号線と第 2 の信号線のいずれか一方のみと電気的に接続させることを特徴とする P C カード。

30 【請求項 13】 請求項 12 記載の P C カードであって、前記信号線切替部は、前記第 1 の電源電圧と前記第 2 の電源電圧の双方が供給されている際、前記共通信号線と電気的に接続させる前記第 1 の信号線又は第 2 の信号線のいずれか一方を選択するスイッチ回路を有していることを特徴とする P C カード。

【請求項 14】 請求項 11 乃至 13 のいずれかに記載の P C カードであって、前記信号線切替部は、前記共通信号線と電気的に接続させない前記第 1 の信号線又は第 2 の信号線のいずれか一方を相対的にハイインピーダンス状態にすることを特徴とする P C カード。

40 【請求項 15】 請求項 10 記載の P C カードであって、前記切替手段は、前記第 1 のインターフェース部と前記第 2 のインターフェース部とに供給される電圧を制御して、前記第 1 及び第 2 のインターフェース部のいずれか一方を非活性状態にする電源制御回路を有していることを特徴とする P C カード。

【請求項 16】 請求項 1 乃至 15 のいずれかに記載の P C カードであって、前記第 2 のインターフェース部は、U S B 規格に対応していることを特徴とする P C カード。

50 【請求項 17】 請求項 1 乃至 15 のいずれかに記載の P

Cカードであって、

前記第2のインターフェース部は、IEEE1394規格に対応していることを特徴とするPCカード。

【請求項18】請求項1乃至17のいずれかに記載のPCカードであって、

前記機能ブロックは、前記第1及び第2の情報処理装置に対してデータ記憶機能を提供することを特徴とするPCカード。

【請求項19】請求項1乃至17のいずれかに記載のPCカードであって、

前記機能ブロックは、前記第1及び第2の情報処理装置に対してデータ通信機能を提供すること特徴とするPCカード。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、各種情報を処理するパーソナルコンピュータやデジタル・スチル・カメラをはじめとする情報処理装置に着脱可能に装着されて使用されるPCカードに関する。

【0002】

【従来の技術】PCカードは、文字、音声、あるいは画像情報等の種々の情報を処理するパーソナルコンピュータ（以下、PCと略称する）やデジタル・スチル・カメラをはじめとする情報処理装置に着脱可能に装着されて使用され、情報処理装置が行う種々の処理の処理能力の向上や処理機能の拡張のために使われている。

【0003】PCカードは、当初、PC用のメモ리카ードの規格を作成するために設けられた団体であるPCMCIA (Personal Computer Memory Card International Association) が発表した統一規格 (PC Card Standard) に基づいて国際標準化され、主として携帯可能な小型PCに利用されていた。PCMCIAの規格に基づくPCカードの物理的仕様（外観形状）は、長さが85.6mm、幅が54.0mmのカード型であり、厚さの相違によりタイプI、タイプII、タイプIIIに区分されている。またPCカードのコネクタには68ピンを有するツープースコネクタが採用されている。PCカードは、携帯可能なPC等に設けられたPCカードインターフェースのPCカードスロットに当該コネクタを差し込んで使用され、使用しない場合にはPCカードスロットから引き抜くことができるようになっている。

【0004】このようにPCカードは容易に着脱できて小型で携帯性に優れているため、その用途は補助記憶装置としての半導体メモ리카ードだけでなく、磁気ディスク等のハードディスク装置を備えた補助記憶装置、あるいはモデム機能やLAN (Local Area Network) 機能等の通信、ネットワーク関連分野にも広がってきている。さらに、PCカードが使用される適

用分野も拡大しつつあり、携帯型の小型PCに限られず、例えばデジタル・スチル・カメラ等のデジタル画像情報処理装置に用いられて、着脱可能で携帯性に優れた画像記憶装置として、あるいはカメラに記憶した画像をPC等に転送するためのデータ転送装置（例えば、LANカードやモデムカード）としても使用されるようになってきている。

【0005】また従来、情報処理装置に対して所望の処理能力や処理機能を与えるには、拡張バス・スロットに所定の機能を有する基板を取り付けたり、PCのマザーボードに接続する内蔵基板モジュールを取り付けたりしなければならず、基板の差し替えや携帯性に困難を伴っていたのに対し、PCカードであれば、PCカードスロットに差し込むPCカードを交換するだけで即座に所望の処理能力、機能を得ることができるという取り扱いの容易さを有している。なお、情報処理装置に対するPCカードの着脱は、差し込んで引き抜く方式や置いて固定したりする方式等がある。

【0006】近年、半導体素子の高集積化技術の発展と共に、より小型化されたPCやデジタル・スチル・カメラ、デジタル・ビデオ・カメラ、あるいは携帯型オーディオ機器等の民生用機器も含めた情報処理装置が開発され、携帯型PCへの利用を意図したPCMCIAの規格に基づく従来のPCカードに加えて、より小型化されたPCカードの出現が要望されるに至った。このため現在以下のような小型のメモ리카ードの規格が提唱され現実

【0007】まず第1にCFA (Compact Flash Association) が提唱する「Compact Flash (サンディスク社の登録商標)」であり、これは外形寸法が36.4×42.8×3.3mm<sup>3</sup>で8MB程度の容量の小型フラッシュメモ리카ードである。第2に松下電池工業(株)、(社)日本電子工業振興協会 (JEIDA: Japan Electronic Industry Development Association)、PCMCIAが提唱する「Small PC Card」であり、これは外形寸法が45.0×42.8×5.0mm<sup>3</sup>で、長さが従来のPCカードの約半分の大きさである。第3は、Miniature Card Implementers Forum、PCMCIAによる「Miniature Card」であり、これは外形寸法が38×33×3.5mm<sup>3</sup>の小型カードである。

【0008】第4には、SSFDC Forumの「SmartMedia (株) 東芝の登録商標)」であり、これは外形寸法が37×45×0.67mm<sup>3</sup>で例えば2MB～16MB程度の容量のフラッシュEEPROMカードである。第5は、MultiMedia Card Associationの提唱する「MMC (MultiMedia Card)」であり、これは

外形寸法が $24 \times 32 \times 1.4 \text{ mm}^3$ で例えば10MB程度の容量のフラッシュEEPROMカードである。第6には、ソニー株式会社が提唱する「メモリスティック（ソニー（株）の商標）」であり、これは外形寸法が $21.5 \times 50 \times 2.8 \text{ mm}^3$ で例えば8MB程度の容量のフラッシュEEPROMカードである。その他、磁気記録によるハードディスク・ドライブを備えた小型PCカードも開発されている。本願においては、以上説明した機能を有する小型カード、さらに、これらに類するカードを含めてPCカードと総称する。

【0009】なお、PCカードは、従来、主として磁気ストライプ付きカードの代替目的で使用されてきたICカードが有している、ICカード同士の互換性の欠如や用途・機能拡張性の限界についての問題を解決することを目的とし、さらにPC等の処理能力、処理機能を拡張させることを目的として物理仕様／電気仕様／ソフトウェア仕様等を新たに策定して実現されたものである。つまり、PCカードは、その起源をICメモリカードに持ちながらも、そのようなICメモリカードとは機構面でも用途面でも大きく異なっている。また、PCカードは、PCの拡張バスアーキテクチャに強く影響された電気仕様／ソフトウェア仕様で標準化されて実現した拡張機能カードとすることができる。従って、その適用分野及び技術分野は、当初ICカードが意図していた範囲の市場分野を遙かに越える機能を提供することができる新たな産業上の利用分野及び技術分野である。

#### 【0010】

【発明が解決しようとする課題】さて、以上説明したようにPCカードは、PCやデジタル・スチル・カメラ等の情報処理装置に備えられたPCカードインターフェースのスロットに差し込んで所定の機能を発揮させるのだが、例えば、デスクトップ型をはじめとする可搬性を有さないホストコンピュータシステムのように、PCカードインターフェースを通常標準では装備していない情報処理装置でPCカードを利用する方法について以下に説明する。

【0011】例えば、特開平7-302140号公報には、PCカードインターフェースを内蔵したPCカード用インターフェースユニットを用意して、当該ユニットを情報処理装置に接続し、PCカードインターフェースに取り付けられたスロットにPCカードを差し込むことにより情報処理装置からPCカードを機能させることが開示されている。

【0012】現在既に、デスクトップ型PCに接続可能なPCカード用インターフェースユニットとして、PCに標準装備されているパラレルポートを利用するタイプやSCSI (Small Computer System Interface) 接続するタイプのPCカードドライブ装置や、あるいは専用のインターフェースボードをPCのPCIスロット等に差し込んで使用するタ

イプのPCカードドライブ装置が存在する。パラレルポート接続やSCSI接続のPCカードドライブ装置では、PCカードのうち主としてメモリカードだけしか使用できないが、専用のインターフェースを用いるドライブ装置では、携帯可能な小型PCに標準で装備されているPCカードインターフェースと同様に基本的に全てのPCカードが使用可能である。

【0013】このように、PCカードインターフェースを備えていない情報処理装置でPCカードを使用するには情報処理装置にPCカードドライブ装置を組み込む必要が生じるが、そのために幾つかの問題が生じる。まず第1に、容易に着脱できる汎用性と小型で携帯性に優れているというPCカードが本来有している利点が損なわれてしまうことである。例えばPCカードインターフェースを備えた情報処理装置(a)でデータを記録したPCカード(メモリカード)を情報処理装置(a)から取り外して携帯して移動させ、別の地点にある情報処理装置(b)でPCカードの内容を読み出そうとした場合、情報処理装置(b)にPCカードドライブ装置が取り付けられていなければ、当然当該PCカードに記録した内容は読み出せない。これを回避するには、PCカードと共にPCカードドライブ装置と一緒に携帯して移動させる方法があるが、これではPCカードの携帯性は著しく損なわれてしまう。

【0014】一方、情報処理装置(b)に予めPCカードドライブ装置を取り付けておけばPCカードの移動だけで済むので携帯性は確保できるが、情報処理装置

(b)が複数台あるような場合には、それぞれの装置(b)にPCカードドライブ装置を設置する必要が生じてコスト高になってしまい経済的でないという第2の問題が生じる。さらに、情報処理装置(b)にPCカードドライブ装置を導入するには専用のドライバーソフトウェアのインストールやボードの設定が必要になり、情報処理装置の維持管理が煩わしくなってしまうという第3の問題も生じる。

【0015】本発明の目的は、PCカードが本来有している着脱容易で汎用性、携帯性に優れている利点を損なうことなく複数の情報処理装置と接続可能なPCカードを提供することにある。また、本発明の目的は、PCカードドライブ装置を有しない情報処理装置にも接続可能なPCカードを提供することにある。さらに、本発明の目的は、情報処理装置に予め標準的に設けられたインターフェースに接続可能なPCカードを提供することにある。

#### 【0016】

【課題を解決するための手段】上記目的は、情報処理装置に対して所定の機能を提供する機能ブロックと、機能ブロックと第1の情報処理装置との間でデータ転送を行う第1のインターフェース部と、第1のインターフェース部と異なるインターフェース仕様を有し、機能ブロッ

クと第2の情報処理装置との間でデータ転送を行う第2のインターフェース部とを少なくとも備えていることを特徴とするPCカードによって達成される。

【0017】本発明のPCカードにおいて、例えば第1のインターフェース部が既存のPCカードインターフェースに対応し、第2のインターフェース部が、PCカードインターフェースと異なる仕様の、例えばUSBインターフェースに対応するように構成すれば、本発明のPCカードは携帯型のPCやデジタル・カメラのようなPCカード用コネクタを有する第1の情報処理装置に使用できるのみならず、デスクトップ型のPCのように標準ではPCカード用コネクタを有さない第2の情報処理装置に対しても、PCカードドライブ装置を接続することなく使用することができるようになり、PCカードの本来有する携帯性、汎用性をさらに向上させることができる。なお、本願において「データ転送」は、メモリカード等に記憶させるべきデータだけでなく、アドレスやPCカードに対するコマンド、あるいはPCカードから情報処理装置に送られるリクエスト信号等を含む広い概念のデータを送受することを意味するものとする。

【0018】本発明のPCカードにおいて、第1のインターフェース部は、第1の情報処理装置と物理的に接続する第1の物理層インターフェースと、第1の物理層インターフェースと機能ブロックとの間に設けられた第1のインターフェース制御部とを有していることを特徴とする。また、第1のインターフェース部は、第1の情報処理装置と機能ブロックとの間で、第1のインターフェース制御部を介した制御手順を実現するための第1の付加回路を有していることを特徴とする。さらに、第1の付加回路は、機能ブロックと第1のインターフェース制御部との間に設けられていることを特徴とする。

【0019】また本発明のPCカードにおいて、第2のインターフェース部は、第2の情報処理装置と物理的に接続する第2の物理層インターフェースと、第2の物理層インターフェースと機能ブロックとの間に設けられた第2のインターフェース制御部とを有していることを特徴とする。また、第2のインターフェース部は、第2の情報処理装置と機能ブロックとの間で、第2のインターフェース制御部を介した制御手順を実現するための第2の付加回路を有していることを特徴とする。さらに、第2の付加回路は、機能ブロックと第2のインターフェース制御部との間に設けられていることを特徴とする。

【0020】本発明のPCカードでは、機能ブロックから第1及び第2のインターフェース部へ複数の信号線が接続され、複数の信号線の少なくとも一部は、共通信号線として分岐部を介して第1のインターフェース部と接続する第1の信号線と、第2のインターフェース部と接続する第2の信号線との双方に接続されていることを特徴とする。また、共通信号線は、第1及び第2の情報処理装置と機能ブロックとの間で転送されるべきデータ信

号あるいはアドレス信号が流れるデータ/アドレス・バスラインであることを特徴とする。

【0021】このように本発明では、機能ブロックから第1及び第2のインターフェース部へ接続された複数の信号線の一部が、共通信号線として分岐部を介して第1のインターフェース部と第2のインターフェース部との双方に接続されているので、簡易な回路構成で複数種類のインターフェースを有するPCカードを実現することができる。また、第1及び第2の付加回路は、第1あるいは第2のインターフェース制御部から受け取ったデータから機能ブロックに対する制御用コマンド、データ等を取り出したり、機能ブロックから受け取ったデータや制御情報を第1あるいは第2のインターフェース制御部のフォーマットに変換したりする機能を有している。また、第1あるいは第2のインターフェース制御部と機能ブロックとの速度的な違いをバッファ処理、WAIT操作などで吸収したり、第1あるいは第2のインターフェース制御部と機能ブロックとのバス信号形式の違いをパラレル/シリアル変換器などで変換したりする機能を有している。

【0022】さらに本発明のPCカードは、第1及び第2のインターフェース部のいずれか一方を選択して機能ブロックに接続する切替手段を有することを特徴とする。さらに切替手段は、第1の信号線と第2の信号線のいずれか一方と共通信号線とを電気的に接続させる信号線切替部を有していることを特徴とする。さらに、信号線切替部は、第1の情報処理装置から第1のインターフェース部に供給される第1の電源電圧と、第2の情報処理装置から第2のインターフェース部に供給される第2の電源電圧とに基づいて、共通信号線を第1の信号線と第2の信号線のいずれか一方のみと電気的に接続させることを特徴とする。またさらに、信号線切替部は、第1の電源電圧と第2の電源電圧の双方が供給されている際、共通信号線と電気的に接続させる第1の信号線又は第2の信号線のいずれか一方を選択するスイッチ回路を有していることを特徴とする。また本発明のPCカードにおいて、信号線切替部は、共通信号線と電気的に接続させない第1の信号線又は第2の信号線のいずれか一方を相対的にハイインピーダンス状態にすることを特徴とする。

【0023】このように本発明では、共通信号線を介して機能ブロックと第1又は第2のインターフェース部との間でデータ転送させる際、データ転送を行わない非活性状態にすべきインターフェース部側の信号線をハイインピーダンス状態に維持させることができるので、データ転送を行うインターフェース部側と機能ブロックとの間の信号線に、転送すべきデータを容易に且つ確実に伝送させることができるようになる。

【0024】また、信号線切替部は、第1の電源電圧と第2の電源電圧の双方が供給されている際、共通信号線

と電気的に接続させる第1の信号線又は第2の信号線のいずれか一方を選択するスイッチ回路を有しているの、PCカードが第1及び第2の情報処理装置の双方に接続されていても、比較的容易に接続を切り替えて交互に第1及び第2の情報処理装置に対してデータ転送を行うことができるようになる。なお、プラグ&プレイによる動的な設定手段を持たないインターフェースの場合は、情報処理装置で動作するソフトウェアからリセット処理をかけて認識することができるので問題はない。

【0025】また本発明のPCカードにおいて、切替手段が、第1のインターフェース部と第2のインターフェース部とに供給される電圧を制御して、第1及び第2のインターフェース部のいずれか一方を非活性状態にする電源制御回路を有していることを特徴とする。

【0026】本発明によれば、第1のインタフェース部及び第2のインターフェース部の両方がそれぞれ第1の情報処理装置及び第2の情報処理装置に接続された状態が生じたとき、いずれか一方のインタフェース部を活性化状態とし、他方のインタフェース部をハインピーダンス状態にすることができるので、活性化状態のインタフェース部側と機能ブロックとの間でのデータ転送の際、転送すべきデータを容易に且つ確実に伝送させることができるようになる。

【0027】また本発明のPCカードにおいて、第2のインターフェース部は、USB規格に対応していることを特徴としている。あるいは、第2のインターフェース部は、IEEE1394規格に対応していることを特徴としている。また本発明のPCカードにおいて、機能ブロックは、第1及び第2の情報処理装置に対してデータ記憶機能を提供することを特徴としている。あるいは、機能ブロックは、第1及び第2の情報処理装置に対してデータ通信機能を提供することを特徴としている。

#### 【0028】

【発明の実施の形態】〔本発明の第1の実施の形態〕本発明の第1の実施の形態によるPCカードを図1を用いて説明する。本実施の形態においては、PCMCIAの規格に基づいたPCカードを例にとって説明する。図1は、平面方向から見たPCカード1内部の概略構成を複数のブロックで示したものである。図1に示すように、PCカード1は、情報処理装置に対して所定の機能を提供する機能ブロック2を有している。この機能ブロック2は、メモリ機能、モデム機能、あるいはLAN機能等種々の機能の一つ又はそれらを複合した機能を情報処理装置に提供することができるようになっている。また、PCカード1は、第1の情報処理装置として例えば携帯型PC（図示を省略）と機能ブロック2との間でデータ転送を行う第1のインターフェース部100を有している。ここで、図示を省略した携帯型PCはPCカードインターフェースを有しているものとする。すると、本実施の形態では、第1のインターフェース部100は、携

帯型PCのPCカードインターフェースと物理的に接続するPCカード物理層インターフェースを第1の物理層インターフェース3として有し、第1の物理層インターフェース3と機能ブロック2との間に第1のインターフェース制御部4としてのPCカードインターフェースを有している。

【0029】さらに、PCカード1は、第2の情報処理装置としてのデスクトップ型PC10と機能ブロック2との間でデータ転送を行う第2のインターフェース部101を有している。ここで、デスクトップ型PC10はPCカードインターフェースを有していないものとする。すると、第2のインターフェース部101は、第1のインターフェース部100と異なるインターフェース仕様を有している。第2のインターフェース部101は、デスクトップ型PC10と接続ケーブル11を介して物理的に接続する第2の物理層インターフェース6と、第2の物理層インターフェース6と機能ブロック2との間に設けられた第2のインターフェース制御部7とを有している。

【0030】また、第2のインターフェース部101は、デスクトップ型PC10と機能ブロック2との間で、第2のインターフェース制御部7を介した制御手順を実現するための第2の付加回路8を有している。この第2の付加回路8は、機能ブロック2と第2のインターフェース制御部7との間に設けられている。

【0031】さて、本実施の形態のPCカード1では、機能ブロック2から第1及び第2のインターフェース部100、101へ複数の信号線102、104、106、108、110が接続されている。複数の信号線102～110の少なくとも一部は共通信号線106として、図中破線で示した分岐部112で分岐して第1のインターフェース部100のPCカードインターフェース制御部である第1のインターフェース制御部4と接続する第1の信号線108と、第2のインターフェース部101の第2の付加回路8と接続する第2の信号線110との双方に接続されている。本実施の形態における共通信号線106と第1及び第2の信号線108、110は、携帯型PC（図示を省略）及びデスクトップ型PC10と機能ブロック2との間で転送されるべきデータ信号あるいはアドレス信号が流れるデータ/アドレス・バスラインとして用いられている。また、図中破線で示された、機能ブロック2と第1のインターフェース制御部4とを接続する信号線102と、機能ブロック2と第2の付加回路8とを接続する信号線104は、それぞれ機能ブロック2を制御するための制御信号が伝送される制御信号線として機能する。

【0032】次に、本実施の形態によるPCカード1の動作について説明する。まず、第2のインターフェース制御部7は、デスクトップ型PC10から第2の物理層インタフェース6を経由して入力された例えばシリアル

データ信号のエラー検出／プロトコル処理等を行ったり、デスクトップ型PC10側がPCカード1をデバイス認識するための制御を行ったりする。このとき、第2の付加回路8は、デスクトップ型PC10と機能ブロック2との間での第2のインターフェース制御部7を介した制御手順を実現するために、機能ブロック2から送出されたデータを第2のインターフェース制御部7に適するデータに変換したり、デスクトップ型PC10から送出され第2の物理層インタフェース6及び第2のインターフェース制御部7を介してパラレル変換されたデータやコマンドを機能ブロック2が解釈できる形式に変換したり、機能ブロック2に適した電氣的インタフェースに変換する処理を行う。

【0033】PCカード1をデスクトップ型PC10に接続して使用する場合には、デスクトップ型PC10が、例えば近時の事実上の標準になりつつあるUSB (Universal Serial Bus) インタフェースを有していれば、第2のインターフェース制御部としてUSBインタフェースを用い、第2の物理層インタフェース6にはUSB用のコネクタあるいはUSB用接続ケーブルの差込口を設けて、PCカード1及びデスクトップ型PC10を接続ケーブル11あるいは赤外線等の無線通信装置で接続してデータ転送を行わせることができるようになる。

【0034】またPCカード1を携帯型PCで使用する場合には、携帯型PCに設けられたPCカードドライブ装置のスロットにPCカード1のPCカード物理層インタフェース3の68個のピンを挿入して接続することにより、従来のPCカードと同様の操作性で使うことができる。

【0035】なお、本実施の形態では、第1のインターフェース部100にPCMCIAの規格に準拠したPCカードインタフェースを有するPCカードを例にとりて説明したが、既に説明した他のPCカード、例えば、「Compact Flash (サンディスク社の登録商標)」、「Small PC Card」、「Minituare Card」、「SmartMedia (株) 東芝の登録商標)」、「MMC (Multimedia Card)」、「メモリスティック (ソニー (株) の商標)」に用いられるインターフェースを第1のインターフェース部100に持たせるようにしてももちろんよい。

【0036】また、上記実施の形態では、共通信号線106を分岐部112で分岐して第1及び第2のインターフェース部100、101に接続するようにしているが、これにより従来の既存の機能ブロック2及び第1のインターフェース部100 (本例ではPCカードインタフェース) の設計変更を極力減らすことができ、簡易な回路構成で第2のインターフェース部101を設けることができるようになる。なお、PCカード1全体を新

規に設計するのであれば、共通信号線106を用いずに、機能ブロック2から第1及び第2のインターフェース部100、101にそれぞれ直接接続される信号線を設けるようにしてもよい。

【0037】また、図1に示したPCカード1は、第1及び第2のインターフェース部100、101を介して機能ブロック2と2つの情報処理装置との間でだけデータ転送を行う構成になっており、機能ブロック2がメモリ機能を有するメモリカード等を意図している。もし、機能ブロック2が、モデム機能やLAN機能等を有する場合には、図1に示すPCカード1の第2の物理層インタフェース6とは異なる位置 (例えば左側) にモデムやLANに対応したコネクタあるいはコネクタ取付口を設け、機能ブロック2から当該コネクタ等に所定の信号線を接続するようにすればよい。そして、情報処理装置からは、第1又は第2のインターフェース部100、101を介してPCカード1に対して種々の設定情報や処理手順が提供され、機能ブロック2はそれらの設定情報や処理手順に基づいて所望の機能を発揮することができるようになる。また、上記実施の形態では、PCカードインタフェースと第2のインターフェース部との2個のインターフェースの組み合わせで説明したが、より多数のインターフェースをPCカードに持たせるようにしてももちろんよい。

【0038】また、PCカード1内部の各回路を動作させる電源電圧 (Vcc) は、PCMCIA規格やUSB規格ではホスト側 (情報処理装置側) からインターフェースを介して当該電源電圧が供給されるようになっている。例えば、電源線を持たないシリアルポート (RS232C等) や、赤外線通信ポート (IrDA等) などに本実施の形態によるPCカード1を接続する際には、別途外部バッテリーを用いるか、あるいはPCカード1内に電源を内蔵させるようにすればよい。また例えば、デスクトップ型PC10の本体とキーボードを接続している接続ケーブルを改造し、当該接続ケーブルに電源電圧取出し用の特別なコネクタを接続することにより、デスクトップ型PC10のキーボードの接続ケーブルからPCカード1に電源電圧を供給することができるようになる。このようにすれば、例えば消費電力の比較的大きなPCカード1に対して、デスクトップ型PC10からは電源だけ供給させることにして、民生用オーディオ機器や情報端末装置等の給電能力の小さい情報処理装置に本実施の形態のPCカード1を使用することができるようになる。

【0039】以上説明したように、本実施の形態によるPCカードは、PCカードインタフェースに限らず異なる仕様の複数のインターフェースに対応可能に構成されているので、携帯型PCやデジタル・カメラのようなPCカード用コネクタを有する情報処理装置に使用できるだけでなく、デスクトップ型PCのように標準ではP



Cカードインターフェースを持たない情報処理装置に対しても、PCカードドライブ装置を接続することなく使用することができるようになり、PCカードの本来有する携帯性、汎用性をさらに向上させることができる。

【0040】〔本発明の第2の実施の形態〕次に、本発明の第2の実施の形態によるPCカードを図2を用いて説明する。本実施の形態も第1の実施の形態と同様に、PCMCIAの規格に基づいたPCカードを例にとって説明する。図2は、平面方向から見たPCカード20内部の概略構成を複数のブロックで示したものである。図1に示した第1の実施の形態によるPCカード1の構成要素と同一の機能作用を有する構成要素には同一の符号を付して詳細な説明は省略するものとする。

【0041】本実施の形態によるPCカード20は、第1及び第2のインターフェース部100、101のいずれか一方を選択して機能ブロック2と接続する切替手段として信号切替部を設けた点に特徴を有している。この信号切替部は、共通信号線106を第1の信号線108と第2の信号線110のいずれか一方と電気的に接続させるマルチプレクサ21を有している。マルチプレクサ21は、図1に示した信号線の分岐部112に配置されている。また信号切替部は、スイッチ23と、集積回路で構成されたバスセクタ制御用ロジック24とを備えたマルチプレクサ制御回路を有している。スイッチ23及びバスセクタ制御用ロジック24は、図中第2の物理層インターフェース6の左側に配置されている。スイッチ23の2つの端子は、一端子が接地（グラウンド電位）され、他端子がバスセクタ制御用ロジック24の—入力端子に接続されている。PCカード20の筐体から外方に突出した切替ボタン118をPCカード20内に押し込むことによりスイッチ23の両端子が接続されて閉（オン）状態になり、切替ボタン118を引き上げることによりスイッチ23の両端子が開放されて開（オフ）状態になるようになっている。

【0042】ここでPCカード内の電源線の配置について説明すると、PCカード物理層インターフェースである第1の物理層インターフェース3の68ピンの端子のうち電源電圧Vcc1が供給されるピン端子に電源線120が接続され、この電源線120は機能ブロック2に接続されて機能ブロック2に電力を供給すると共に、バスセクタ制御用ロジック24の他の入力端子に接続されている。一方、第2の物理層インターフェース6からの電源電圧Vcc2は電源線124に供給され、電源線124は機能ブロック2に接続されて機能ブロック2に電力を供給すると共に、バスセクタ制御用ロジック24のさらに他の入力端子に接続されている。また、バスセクタ制御用ロジック24の出力端子は信号線126によりマルチプレクサ21のバス・スイッチ・イネーブルピンBXに接続されている。

【0043】以上説明したような配置構成を有する信号

切替部は、図示を省略した携帯型PCから第1のインターフェース部100に供給される第1の電源電圧Vcc1と、デスクトップ型PCから第2のインターフェース部101に供給される第2の電源電圧Vcc2とに基づいて、第1の信号線108又は第2の信号線110のいずれか一方の信号線を共通信号線106に対して相対的にハイインピーダンス状態にさせて電気的に非接続状態を形成し、他方の信号線を共通信号線106と電気的に接続するように動作する。また、信号線切替部のスイッチ23は、第1の電源電圧Vcc1と第2の電源電圧Vcc2の双方が供給された際、共通信号線106と電気的に接続させる第1の信号線108又は第2の信号線110のいずれか一方を選択するために用いられる。これらについては後程詳述する。

【0044】次に、本実施の形態によるPCカード20の動作について説明する。ここで、第1及び第2のインターフェース部100、101の双方に情報処理装置が接続されているものとする。つまり、第1の物理層インターフェース3が図示を省略した携帯型PCのPCカードドライブ装置のスロットに挿入されており、第2の物理層インターフェース6は、例えば図1に示したように、接続ケーブル11を介してデスクトップ型PCのUSB用のコネクタに接続されているものとする。このような場合、何れの情報処理装置とPCカード20とでデータ転送を行わせるかを選択する必要がある。さらに、一方のインターフェース部でデータ転送をしている際に他方のインターフェース部の影響を受けないようにすることが必要である。

【0045】このため、第2のインターフェース制御部7及び第2の付加回路8を使用しない状態では、第2の付加回路8に接続された第2の信号線110は第1のインターフェース制御部4に対してハイインピーダンス状態に保持する必要がある。あるいは逆に第1のインターフェース制御部4を使用しない状態では、第1のインターフェース制御部4に接続された第1の信号線108は、第2の付加回路8に対してハイインピーダンス状態に保持されることが必要である。

【0046】本実施の形態のマルチプレクサ21は、マルチプレクサ21のバス・スイッチ・イネーブルピンBXにハイ（H）電圧が印加される、つまりバスセクタ制御用ロジック24から信号「1」が出力されると、第2の信号線110側をハイインピーダンス状態にして機能ブロック2からの共通信号線106を第1のインターフェース制御部4側の第1の信号線108に接続する。また、バス・スイッチ・イネーブルピンBXにロー（L）電圧が印加される、つまりバスセクタ制御用ロジック24から信号「0」が出力されると、マルチプレクサ21は、第1の信号線108側をハイインピーダンス状態にして共通信号線106を第2の付加回路8側の第2の信号線110に接続するようになっている。このバスセ



レクタ制御用ロジック24の動作を示す真理値表を表1 \* 【0047】  
に示す。 \* 【表1】

選 択 さ れ る イ ン タ フ ェ ー ス	②	①	②	①
V c c 1	0	1	1	1
V c c 2	1	0	1	1
S W	x	x	L	H i Z
O U T	0	1	0	1

表1 バスセクタ・制御用ロジックの真理値表

【0048】表1において、①は第1のインターフェース部100を、②は第2のインターフェース部101を示している。また、「SW」はバスセクタ制御用ロジック24へ入力する切替信号のレベルを示しており、

「L」はスイッチ23を開（オン）状態にして接地電圧が印加されてロー状態であることを示し、「HiZ」はスイッチ23を開（オフ）状態にしてハイ状態（ハイインピーダンス状態）であることを示している。この真理値表から明かなように、携帯型PCから電源電圧Vcc1が入力され、デスクトップ型PCのUSB用のコネクタから、あるいは上述のキーボード用の接続ケーブルから電源電圧Vcc2が入力されたとき、スイッチ23をオンにしてバスセクタ制御用ロジック24の入力（SW）をロー状態（L）にすれば出力端子（OUT）には信号「0」が出力され、スイッチ23をオフにしてバスセクタ制御用ロジック24の入力（SW）をハイ状態（HiZ）にすれば出力端子（OUT）には信号「1」が出力される。

【0049】またスイッチ23がロー状態にあるかハイ状態にあるかに係わらず、バスセクタ制御用ロジック24の出力端子（OUT）からは、Vcc1が印加されてVcc2が印加されなければ信号「1」が出力され、逆にVcc2が印加されてVcc1が印加されなければ信号「0」が出力されるようになっている。

【0050】従って、スイッチ23が図2に示した開状態において、PCカード20の第1の物理層インタフェース3側が携帯型PCのPCカードドライブ装置のロットに挿入され、第2の物理層インタフェース6が、図1に示すような接続ケーブル11によりデスクトップ型PC10のUSB用のコネクタに接続されていると、電源電圧Vcc2がデスクトップ型PC10から第2の物理層インタフェース6を経由してバスセクタ制御用ロジック24に入力される。スイッチ23は開状態であるからバスセクタ制御用ロジック24の入力（SW）はハイ状態（HiZ）になり出力端子（OUT）には信号「1」が出力されてマルチプレクサ21のバス・スイッチ・イネーブルピンBXに入力される。マルチプレクサ

21は、機能ブロック2からの共通信号線106の接続を第1のインタフェース制御部4側に切り替えるために、第2の付加回路8側をハイ・インピーダンス状態にする。これにより例えば、PCカード20が携帯型PCとデスクトップ型PCの双方に接続されていても、携帯型PCからPCカード20に対してデータの送受を行うことはできるが、デスクトップ型PCからPCカード20に対してはアクセスできないようにすることができる。

【0051】この状態から、デスクトップ型PCがPCカード20にアクセスできるようにするには、スイッチ23を開状態（オン）にすればよい。これによりバスセクタ制御用ロジック24の入力（SW）がロー状態（L）になり出力端子（OUT）には信号「0」が出力されてマルチプレクサ21のバス・スイッチ・イネーブルピンBXに入力される。マルチプレクサ21は、機能ブロック2からの共通信号線106の接続を第2の付加回路8側に切り替えるために、第1のインタフェース制御部4側をハイ・インピーダンス状態にする。これによりPCカード20は第2の物理層インタフェース6に接続されたデスクトップ型PCに対して接続状態となり、携帯型PCからPCカード20にアクセスすることはできなくなる。なお、プラグ&プレイによる動的な設定手段を持たないインタフェースの場合は、情報処理装置で動作するソフトウェアからリセット処理をかけて認識することができるので問題はない。

【0052】〔本発明の第3の実施の形態〕次に、本発明の第3の実施の形態によるPCカードを図3を用いて説明する。本実施の形態も第1及び第2の実施の形態と同様に、PCMCIAの規格に基づいたPCカードを例にとって説明する。図3は、平面方向から見たPCカード30内部の概略構成を複数のブロックで示したものである。図1及び図2に示した第1及び第2の実施の形態によるPCカード1、20の構成要素と同一の機能作用を有する構成要素には同一の符号を付して詳細な説明は省略するものとする。また、図3においては、機能ブロック2からの共通信号線及び第1及び第2のインターフ

エース部100、101に接続された信号線（制御信号線を含む）の図示は省略している。

【0053】本実施の形態によるPCカード30は、第1及び第2のインターフェース部100、101のいずれか一方を選択して機能ブロック2に接続する切替手段として電源制御回路31を設けた点に特徴を有している。この電源制御回路31は、第1のインターフェース部100と第2のインターフェース部101とに供給される電圧Vcc1-inとVcc2-inを制御して、第1及び第2のインターフェース部100、101のいずれか一方を非活性状態にするように動作すること

【0054】図3において、図示した電圧「Vcc1-in」は第1のインタフェース制御部4からの電源電圧Vcc1が電源制御回路31に入力することを示している。表記「in」、「out」は電源制御回路31の入力、出力を示し、例えば「Vcc1-in」は電源制御回路31に電源電圧Vcc1が入力することを示し、「Vcc1-out」は電源制御回路31から電源電圧Vcc1が出力されることを示している。

【0055】本実施の形態における電源制御回路31は、電源電圧Vcc1が入力されると電圧Vcc1及びVccFを出力し、電源電圧Vcc2が入力されると電圧Vcc2及びVccFを出力する。そして電源電圧Vcc1とVcc2の双方が入力されたときは、Vcc1とVccFを出力するように構成されている。なお、VccFは機能ブロック2に供給される電圧である。

【0056】PCカード30が携帯型PCのPCカードドライブ装置のスロットに挿入されると、第1のインタフェース制御部4から電源電圧Vcc1が電源制御回路31に入力される。これにより電源制御回路31から第1の付加回路5に対して電源電圧Vcc1が出力され、また機能ブロック2に対して電源電圧VccFが出力される。これにより機能ブロック2、第1の付加回路5が活性状態となり、携帯型PCからPCカード30にアクセスできるようになる。

【0057】また、PCカード30が携帯型PCのPCカードドライブ装置のスロットに挿入されず、第2の物理層インタフェース6がデスクトップ型PCのUSBコネクタと接続された場合には、第2のインターフェース制御部7から電源電圧Vcc2が電源制御回路31に入力する。これにより電源制御回路31から第2の付加回路8に対して電源電圧Vcc2が出力され、また機能ブロック2に対して電源電圧VccFが出力される。これにより機能ブロック2、第2の付加回路8が活性状態となり、デスクトップ型PCからPCカード30にアクセスできるようになる。

【0058】PCカード30が携帯型PCのPCカードドライブ装置のスロットに挿入されていて、第2の物理層インタフェース6がデスクトップ型PCのUSBコネクタに接続されている場合には、電源制御回路31には第1のインタフェース制御部4から電源電圧Vcc1が入力され、且つ第2のインターフェース制御部7から電源電圧Vcc2が入力されることになる。このときは前述のように電源制御回路31は第1の付加回路5に対して電源電圧Vcc1を出力し、機能ブロック2に対して電源電圧VccFを出力するので、機能ブロック2及び第1の付加回路5は活性状態になり、第2のインターフェース部101は非活性状態になる。

【0059】このように本実施の形態では、機能ブロック2と第1又は第2のインターフェース部100、101との間でデータ転送させる際、データ転送を行わない非活性状態にすべきインターフェース部側に電力を供給せずに、データ転送を行うインターフェース部側と機構ブロック2にのみ電力を供給する電源制御回路31を設けるようにしたので、転送すべきデータを容易に且つ確実に伝送させることができるようになると共に、構成が複雑なマルチプレクサを使用するよりも簡単な構成でインターフェースの活性、非活性を切り替えることができるようになる。

【0060】また、上記実施の形態では、第1及び第2のインターフェース部100、101の双方に情報処理装置が接続されている場合には、第1のインターフェース部100に接続された情報処理装置にアクセス権を与えるように決めていたが、もちろんこれに限られず、例えば、時間的に先に接続されている情報処理装置がPCカード30とアクセスする優先権を持つように構成してもよいし、第2の実施の形態に示したようなスイッチ回路を設けて、PCカード30が携帯型PC及びデスクトップ型PCの双方に接続されていても、利用者が任意に接続を切り替えて交互に携帯型PC及びデスクトップ型PCに対してデータ転送を行えるようにしてももちろんよい。

【0061】〔本発明の第4の実施の形態〕次に、本発明の第4の実施の形態によるPCカードを図4を用いて説明する。本実施の形態では、近年、デジタル・スチル・カメラや携帯端末の記録メディアとして広く使用されているPCMCIA ATA(AT Attachment)カードを例にとって説明する。図4は、平面方向から見たPCカード40内部の概略構成を複数のブロックで示したものである。

【0062】図4において、第1のインターフェース部100は、PCカード物理層インタフェース42と共に、PCMCIA ATAインタフェース45を有している。一方、第2のインターフェース部101は、USB物理層インタフェース43とUSBインタフェース44、及びIDE(Integrated Dri

ve Electronics) インターフェース47とを有している。そして、これら第1及び第2のインターフェース部100、101は、フラッシュコントローラ46に接続されている。

【0063】PCMCIA ATAインターフェース45からPCカード物理層インタフェース42へ接続された複数の信号線A、Bのうち、データ/アドレスラインである共通信号線Aは、分岐してUSBインターフェース44にも接続されている。USBインターフェース44からUSB物理層インターフェース43及び接続ケーブルを介してデスクトップ型PCのUSBポートと接続することにより、デスクトップ型PCはPCカード(PCMCIA ATAカード)40にアクセスできるようになる。

【0064】図4に示すように、PCカード40にはフラッシュメモリ41-1、41-2、41-3が設けられている。これらフラッシュメモリ41-1、41-2、41-3は、フラッシュメモリ41-3と、PCMCIA ATAインターフェース45及びIDEインターフェース47との間に設けられたフラッシュコントローラ46に制御信号線Cで接続されている。また、USBインターフェース44にはUSBラインドライバ/レシーバ44-1、IDEコマンドデコーダ44-2、IDEホストインタフェース44-3が設けられている。

【0065】PCMCIA ATAインターフェース45にはドライバ/レシーバが設けられ、PCカード物理層インタフェース42からの信号線のうちIDEインターフェース44-3と共用する共通信号線Aと、共用しない非共通信号線Bとが接続されている。フラッシュコントローラ46はPCカードインタフェースとして機能し、共通信号線Aと非共通信号線Bとに入力された入力信号をデコードし、デコードした入力信号に基づいて制御信号線Cを介してフラッシュメモリ41-1～41-3に対する処理を行ったり、またIDEコマンドデコーダ44-2によるデコード結果に基づいて共通信号線Aを経由して伝達される制御信号によりフラッシュメモリ41-1～41-3に対する処理を行う。ここで、表2を用いてUSBインターフェース44の信号線について説明する。表2に示すように、USBインターフェース44の信号線は、電源電圧Vcc=5V、ディファレンシャルのデータ用信号線D+、D-、及び接地線の計4本が設けられている。なお、PCカード40のUSB物理層インターフェース43は他の周辺装置とのシリアル接続のために接続ポートを2個有している。

【0066】

【表2】

V B u s	公称 5 V
D +	データ (+)
D -	データ (-)
G N D	ground

表2 USBインターフェース信号線仕様

【0067】このPCカード40を携帯型PCのPCカードドライブ装置のスロットに挿入するとPCカード物理層インタフェース42を経由して制御信号が伝達される。この制御信号のうちIDEホストインタフェース44-3と共用される制御信号は共通信号線Aに送出され、共用されない制御信号は非共通信号線Bに送出される。共通信号線A及び非共通信号線Bに送出された制御信号はPCMCIA ATAインターフェース45を介してフラッシュコントローラ46でデコードされ、デコードされた制御信号に応じた処理がフラッシュメモリ41-1～41-3において行われる。フラッシュメモリ41-1～41-3での処理の結果得られたデータはフラッシュコントローラ46からPCMCIA ATAインターフェース45に伝達され、PCカード物理層インタフェース42を経由して携帯型PCに送出される。このようにしてPCカード40をPCMCIA ATAカードとして動作させることができる。

【0068】一方、デスクトップ型PCのUSBポートに接続されたUSB接続ケーブルのコネクタとPCカード40のUSB物理層インタフェース43とが接続された場合には、デスクトップ型PCからの制御信号(シリアル信号)が入力されてUSBラインドライバ/レシーバ44-1のレシーバで受信され、次いで制御信号のシリアル/パラレル変換が行われる。

【0069】パラレル信号に変換された制御信号はIDEコマンドデコーダ44-2でデコードされてIDEホストインタフェース44-3を経由して共通信号線Aに出力される。共通信号線Aに出力された制御信号はIDEインターフェース47を経由してフラッシュコントローラ46に伝達され、所定の処理がフラッシュメモリ41-1～41-3に対して行われる。以上説明した動作により、PCカード40をデスクトップ型PCのUSBポートに接続されたIDEドライブとして動作させることができるようになる。

【0070】なお本実施の形態によるPCカード40においても、情報処理装置との接続は例えば赤外線通信をはじめとする無線での接続をすることもできるし、デスクトップ型PCのキーボードの接続ケーブルから電源線を取得するようにすることも可能である。また、上記第1乃至第4の実施の形態によるPCカードにおいては、第2のインターフェース部101がUSB規格に対応している場合で説明したが、例えばデスクトップ型PCが

コネクタを有しているのであれば、上記実施の形態の P C カード 1、2 0、3 0、4 0 の第 2 のインターフェース部 1 0 1 を I E E E 1 3 9 4 規格に対応したインターフェースにしてももちろんよい。

# 【0 0 7 1】

【発明の効果】以上の通り、本発明によれば、P C カードが本来有している着脱容易で汎用性、携帯性に優れている利点を損なうことなく複数の情報処理装置と接続可能な P C カードを実現できる。また、本発明によれば、P C カードドライブ装置を有さない情報処理装置にも接続可能な P C カードを実現できる。さらに、本発明によれば、情報処理装置に予め標準的に設けられたインターフェースに接続可能な P C カードを実現することができる。

# 【図面の簡単な説明】

【図 1】本発明の第 1 の実施の形態による P C カードの概略の構成を示す図である。

【図 2】本発明の第 2 の実施の形態による P C カードの概略の構成を示す図である。

【図 3】本発明の第 3 の実施の形態による P C カードの概略の構成を示す図である。

【図 4】本発明の第 4 の実施の形態による P C カードの概略の構成を示す図である。

# 【符号の説明】

1、2 0、3 0、4 0 P C カード  
2 機能ブロック  
3、4 2 第 1 の物理層インターフェース (P C カード物理層インターフェース)

4 第 1 のインターフェース制御部 (P C カードインターフェース)

5 第 1 の付加回路

6 第 2 の物理層インターフェース

7 第 2 のインターフェース制御部

8 第 2 の付加回路

1 0 デスクトップ型 P C

1 1 接続ケーブル

2 1 マルチプレクサ

1 0 2 3 スイッチ

2 4 バスセクタ制御用ロジック

3 1 電源制御回路

4 1 - 1 ~ 4 1 - 3 フラッシュメモリ

4 3 U S B 物理層インターフェース

4 4 U S B インターフェース

4 5 P C M C I A A T A インターフェース

4 6 フラッシュコントローラ

4 7 I D E インターフェース

1 0 0 第 1 のインターフェース部

1 0 1 第 2 のインターフェース部

1 0 2、1 0 4 信号線

1 0 6 共通信号線

1 0 8 第 1 の信号線

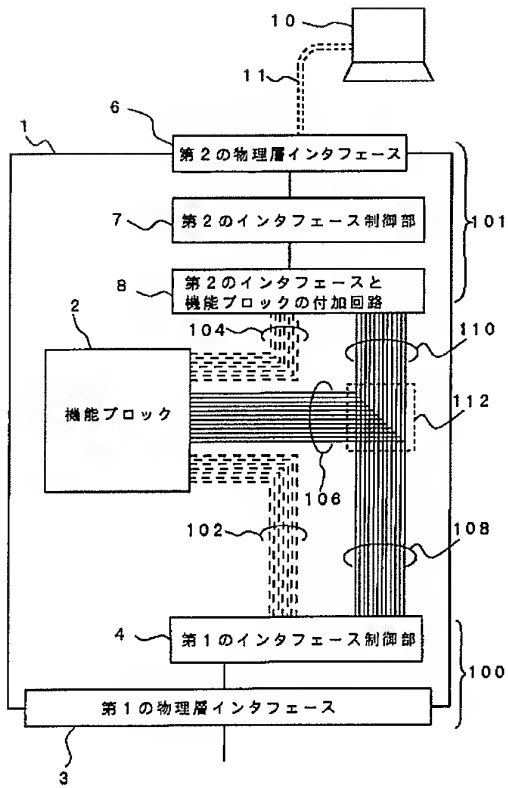
1 1 0 第 2 の信号線

1 1 2 分岐部

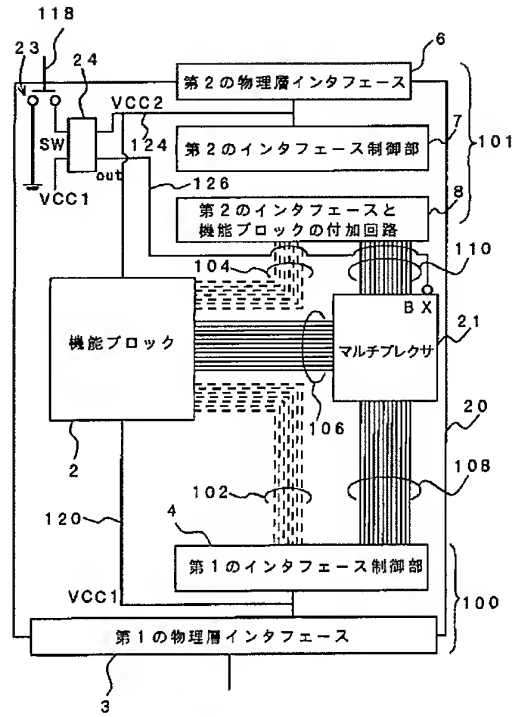
1 1 8 切替ボタン

1 2 0、1 2 4 電源線

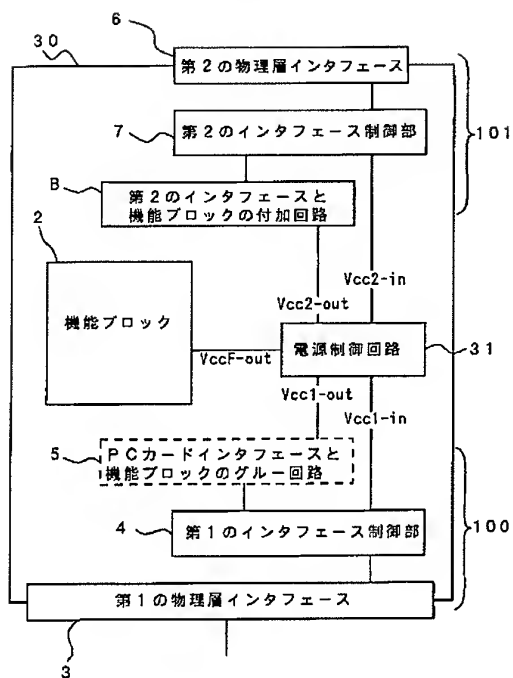
【図1】



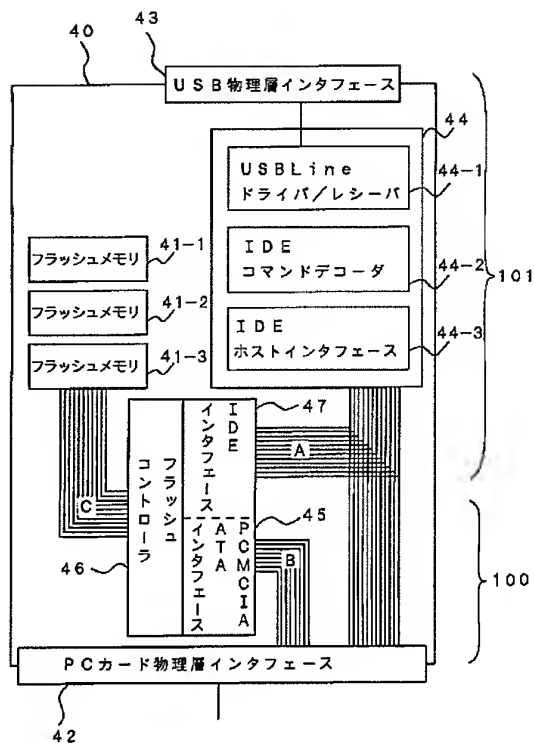
【図2】



【図3】



【図4】



フロントページの続き

(51)Int.Cl.<sup>6</sup>

G 0 6 F 13/38

G 0 6 K 19/077

識別記号

3 2 0

F I

G 0 6 F 13/38

G 0 6 K 19/00

3 2 0 A

K

## CLAIMS

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[Claim(s)]

[Claim 1]The 1st interface part that performs data transfer between a functional block which provides a predetermined function to information processing equipment, and said functional block and the 1st information processing equipment, A PC card having at least the 2nd interface part that has different interface specification from said 1st interface part, and performs data transfer between said functional block and the 2nd information processing equipment.

[Claim 2]Are the PC card according to claim 1, and said 1st interface part, A PC card having the 1st interface control part provided between the 1st physical layer interface that connects with said 1st information processing equipment physically, the 1st [ said ] physical layer interface, and said functional block.

[Claim 3]A PC card which is the PC card according to claim 2, and is characterized by said 1st interface part having the 1st additional circuit for realizing a control procedure which passed said 1st interface control part between said 1st information processing equipment and said functional block.

[Claim 4]A PC card which is the PC card according to claim 3, and is characterized by providing said 1st additional circuit between said functional block and said 1st interface control part.

[Claim 5]Are the PC card according to any one of claims 1 to 4, and said 2nd interface part, A PC card having the 2nd interface control part provided between the 2nd physical layer interface that connects with said 2nd information processing equipment physically, the 2nd [ said ] physical layer interface, and said functional block.

[Claim 6]A PC card which is the PC card according to claim 5, and is characterized by said 2nd interface part having the 2nd additional circuit for realizing a control procedure which passed said 2nd interface control part between said 2nd information processing equipment and said functional block.

[Claim 7]A PC card which is the PC card according to claim 6, and is characterized by providing said 2nd additional circuit between said functional block and said 2nd interface control part.

[Claim 8]Are the PC card according to any one of claims 1 to 7, and two or more signal wires are connected to said 1st and 2nd interface parts from said functional block, A PC card, wherein said at least some of two or more signal wires are connected to both sides of the 1st signal wire connected with said 1st interface part via a tee as common signal lines, and the 2nd signal wire linked to said 2nd interface part.

[Claim 9]A PC card, wherein it is the PC card according to claim 8 and said common signal lines are bus lines into which a data signal which should be transmitted between said 1st and



2nd information processing equipments and said functional block, an address signal, or at least one signal in a command signal flows.

[Claim 10]A PC card which is the PC card according to claim 8 or 9, and is characterized by having a switching means which chooses either of said 1st and 2nd interface parts, and is connected to said functional block.

[Claim 11]A PC card which is the PC card according to claim 10, and is characterized by said switching means having a signal wire switching part which electrically connects said common signal lines only to the 2nd either one of said 1st signal wire or signal wire.

[Claim 12]Are the PC card according to claim 11, and said signal wire switching part, The 1st power supply voltage supplied to said 1st interface part from said 1st information processing equipment, A PC card electrically connecting said common signal lines only to the 2nd either one of said 1st signal wire or signal wire based on the 2nd power supply voltage supplied to said 2nd interface part from said 2nd information processing equipment.

[Claim 13]Are the PC card according to claim 12, and said signal wire switching part, A PC card having a switching circuit which chooses either of said 1st signal wire or the 2nd signal wire electrically connected to said common signal lines when both sides of said 1st power supply voltage and said 2nd power supply voltage are supplied.

[Claim 14]A PC card which is the PC card according to any one of claims 11 to 13, and is characterized by said signal wire switching part making relatively either of said 1st signal wire or the 2nd signal wire which is not electrically connected to said common signal lines a high impedance state.

[Claim 15]Are the PC card according to claim 10, and said switching means, A PC card controlling voltage supplied to said 1st interface part and said 2nd interface part, and having a control circuit which makes either of said 1st and 2nd interface parts a non-active state.

[Claim 16]A PC card which is the PC card according to any one of claims 1 to 15, and is characterized by said 2nd interface part supporting a USB standard.

[Claim 17]A PC card which is the PC card according to any one of claims 1 to 15, and is characterized by said 2nd interface part supporting an IEEE1394 standard.

[Claim 18]A PC card which is the PC card according to any one of claims 1 to 17, and is characterized by said functional block providing a data storage function to said 1st and 2nd information processing equipments.

[Claim 19]A PC card which is the PC card according to any one of claims 1 to 17 and by which it is providing [ said functional block ]-to said 1st and 2nd information processing equipments- data communication facility characterized.

## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the PC card used for information processing equipments including the personal computer and digital still camera which process a variety of information equipping them with removable.

[0002]

[Description of the Prior Art] The personal computer which processes the information on versatility [ PC card ], such as a character, a sound, or picture information. (It is hereafter called PC for short) It is used for information processing equipments including a digital still camera, equipping them removable, and is used for improvement in the throughput of the various processings which information processing equipment performs, or extension of a processing capability.

[0003] A PC card The beginning, In order to create the standard of the memory card for PC. International standardization is carried out based on the common protocol (PC Card Standard) which PCMCIA (Personal Computer Memory Card International Association) which is the provided organization announced, It was used for mainly portable small PC. The physical specification (appearance shape) of a PC card based on the standard of PCMCIA is a card shape with a length of 85.6 mm and a width of 54.0 mm.

It is classified into Type I, Type II, and Type III by difference of thickness.

The two-piece connector which has 68 pins is adopted as the connector of a PC card. A PC card can be drawn out from a PC Card slot, when it is used inserting in the PC Card slot of PC card interface provided in portable PC etc. and does not use the connector concerned for it.

[0004] Thus, since a PC card can be detached and attached easily, and is small and it excels in portability, The use is spreading not only in the semiconductor memory card as an auxiliary storage unit but in communication of the auxiliary storage unit provided with hard disk drives, such as a magnetic disk, or a modem function, a LAN (Local Area Network) function, etc. and the network related field. As an image storage which the field of application for which a PC card is used was also expanded, and it was not restricted to portable small PC, for example, it was used for digital-image-information processing units, such as a digital still camera, was removable, and was excellent in portability, Or it is increasingly used also as a data transfer unit (for example, a LAN card and a modem card) for transmitting the picture memorized to the camera to PC etc.

[0005] In order to give desired throughput and processing capability to information processing equipment conventionally, The substrate which has a predetermined function into an expansion bus slot must be attached, or the built-in board module linked to the mother board of

PC must be attached, To having followed difficulty on substitution and the portability of the substrate, if it is a PC card, it has an ease of handling that desired throughput and a function can be immediately obtained only by exchanging the PC card inserted in a PC Card slot. There are a system which inserts the attachment and detachment of a PC card to information processing equipment, and is drawn out, a system placed and fixed, etc.

[0006]PC and the digital still camera which were miniaturized more with development of the high integration technology of a semiconductor device in recent years, Information processing equipment also including consumer appliances, such as a digital camcorder or portable audio apparatus, is developed, and, in addition to the conventional PC card based on the standard of PCMCIA which meant use to portable PC, the appearance of the PC card miniaturized more came to be demanded. For this reason, the standard of the following small memory cards is advocated now, and it has appeared in a commercial scene as a product actually.

[0007]It is "Compact Flash (registered trademark of SanDisk)" which CFA (Compact Flash Association) advocates [ 1st ] first, The outside dimension of this is small flash memory card with a capacity of about 8 MB in  $36.4 \times 42.8 \times 3.3\text{-mm}^3$ . The 2nd Matsushita Battery Industrial Co., Ltd., Japan Electronic Industry Development Association (JEIDA: Japan Electronic Industry Development Association), it is "Small PC Card" which PCMCIA advocates, and an outside dimension is  $45.0 \times 42.8 \times 5.0\text{-mm}^3$ , and this is a size for the minute of the PC card of the former [ length ] half [ about ]. The 3rd is Miniature Card Implementers Forum and "Minituare Card" by PCMCIA, and the outside dimension of this is a small card of  $38 \times 33 \times 3.5\text{-mm}^3$ .

[0008]It is "SmartMedia (registered trademark of Toshiba Corp.)" of SSFDC Forum the 4th, and the outside dimension of this is a flash EEPROM card with a capacity of 2 MB - about 16 MB in  $37 \times 45 \times 0.67\text{-mm}^3$ . The 5th is "MMC (MultiMedia Card)" which MultiMedia Card Association advocates, and the outside dimension of this is a flash EEPROM card with a capacity of about 10 MB in  $24 \times 32 \times 1.4\text{-mm}^3$ . It is "the memory stick (trademark of Sony Corp.)" which SONY CORPORATION advocates in the 6th, and the outside dimension of this is a flash EEPROM card with a capacity of about 8 MB in  $21.5 \times 50 \times 2.8\text{-mm}^3$ . In addition, the small PC card provided with the hard disk drive by magnetic recording is also developed. In an application concerned, it is named a PC card generically including the small card which has the function explained above, and the card which is similar to these further.

[0009]. The IC card used mainly for the purpose of substituting for a card with a magnetic stripe has the PC card conventionally. For the purpose of making the throughput of PC etc., and a processing capability extend further for the purpose of solving the problem about lack of the compatibility of IC cards, or the limit of a use and expansion nature, it newly decides upon physical specification / electric specification / software specification, and realizes. That is, the PC card differs from such an IC memory card greatly also in respect of the mechanism or the

use, though it has the origin in an IC memory card. A PC card can be said to be the expanded-function card realized by being standardized by the electric specification / software specification strongly influenced in the extended bus architecture of PC. Therefore, the field of application and technical field are new Field of the Invention and the technical field which can provide the function which exceeds the commercial-scene field of the range whose intention the IC card had at the beginning you to be Haruka.

[0010]

[Problem to be solved by the invention]now, although it inserts in the slot of PC card interface in which information processing equipments, such as PC and a digital still camera, were equipped with the PC card explained above as carried out, and a predetermined function is demonstrated, For example, how to use a PC card like the host computer system which does not have portability including a desktop type with the information processing equipment which has not usually equipped PC card interface as standard is explained below.

[0011]For example, JP,H7-302140,A has disclosed operate a PC card from information processing equipment by inserting a PC card in the slot which prepared the interface unit for PC cards which built in PC card interface, connected the unit concerned to information processing equipment, and was attached to PC card interface.

[0012]Already now as an interface unit for PC cards connectable with desktop type PC, The PC card drive equipment of the type using the parallel port with which PC is equipped standardly, or the type which makes SCSI (Small Computer System Interface) connection, Or the PC card drive equipment of the type which uses an interface board for exclusive use for the PCI slot of PC, etc. inserting it exists. In the PC card drive equipment of parallel port connection or SCSI connection. Although only a memory card can mainly be used among PC cards, all the PC cards are fundamentally usable like PC card interface with which portable small PC is equipped as standard in the drive device using an interface for exclusive use.

[0013]Thus, although it will be necessary to build PC card drive equipment into information processing equipment with information processing equipment which is not provided with PC card interface using a PC card therefore, some problems arise. It is that an advantage which a PC card of it being as small as flexibility which can be detached and attached easily to the 1st, and excelling in portability first originally has will be spoiled. For example, a PC card (memory card) which recorded data is removed, carried and moved from information processing equipment (a) with information processing equipment (a) provided with PC card interface, If PC card drive equipment is not attached to information processing equipment (b) when trying to read the contents of the PC card with information processing equipment (b) at another point, contents naturally recorded on the PC card concerned cannot be read. In order to avoid this, there is a method of carrying PC card drive equipment together and moving it with a PC card, but now, the portability of a PC card will be spoiled remarkably.

[0014]On the other hand, since only movement of a PC card will be required if PC card drive equipment is beforehand attached to information processing equipment (b), portability is securable, but. When there are two or more information processing equipments (b), it will be necessary to install PC card drive equipment in each equipment (b), and becomes a high cost, and the 2nd problem of not being economical arises. Installation of driver software for exclusive use and setting out of a board are needed for introducing PC card drive equipment into information processing equipment (b), and the 3rd problem that control of maintenance of information processing equipment will become troublesome is also produced.

[0015]the attachment and detachment which, as for the purpose of this invention, the PC card originally has -- it is easy, and it is in providing two or more information processing equipments and a connectable PC card, without spoiling an advantage excellent in flexibility and portability. The purpose of this invention is to provide a PC card connectable also with the information processing equipment which does not have PC card drive equipment. The purpose of this invention is to provide a PC card connectable with the interface beforehand formed in information processing equipment standardly.

[0016]

[Means for solving problem]The functional block with which the above-mentioned purpose provides a predetermined function to information processing equipment, The 1st interface part that performs data transfer between a functional block and the 1st information processing equipment, It has different interface specification from the 1st interface part, and is attained by the PC card having at least the 2nd interface part that performs data transfer between a functional block and the 2nd information processing equipment.

[0017]In the PC card of this invention, the 1st interface part corresponds to the existing PC card interface, If the 2nd interface part constitutes so that it may correspond to the USB interface of different specification from PC card interface, It not only can use the PC card of this invention for the 1st information processing equipment that has a connector for PC cards like portable PC or a digital camera, but, It can be used also to the 2nd information processing equipment that does not have a connector for PC cards as standard like desktop type PC, without connecting PC card drive equipment, and the portability of a PC card which it originally has, and flexibility can be raised further. The "data transfer" as used in an application concerned shall mean sending and receiving the data of a large concept including the command over not only data but the address and PC card which should be stored in a memory card etc., or the request signal sent to information processing equipment from a PC card.

[0018]This invention is characterized by that a PC card of this invention comprises:

The 1st physical layer interface that connects the 1st interface part with the 1st information processing equipment physically.

The 1st interface control part provided between the 1st physical layer interface and a functional

block.

The 1st interface part has the 1st additional circuit for realizing a control procedure through the 1st interface control part between the 1st information processing equipment and a functional block. The 1st additional circuit is provided between a functional block and the 1st interface control part.

[0019]In a PC card of this invention, the 2nd interface part, The 2nd interface control part provided between the 2nd physical layer interface that connects with the 2nd information processing equipment physically, the 2nd physical layer interface, and a functional block It has. The 2nd interface part has the 2nd additional circuit for realizing a control procedure through the 2nd interface control part between the 2nd information processing equipment and a functional block. The 2nd additional circuit is provided between a functional block and the 2nd interface control part.

[0020]In the PC card of this invention, from a functional block, two or more signal wires are connected to the 1st and 2nd interface parts, and at least some two or more signal wires. It is connected to the both sides of the 1st signal wire connected with the 1st interface part via a tee as common signal lines, and the 2nd signal wire linked to the 2nd interface part. Common signal lines are characterized by being the data/address bus line into which the data signal or address signal which should be transmitted between the 1st and 2nd information processing equipments and a functional block flows.

[0021]Thus, some of two or more signal wires connected to the 1st and 2nd interface parts from the functional block in this invention. Since it is connected to the both sides of the 1st interface part and the 2nd interface part via the tee as common signal lines, the PC card which has two or more kinds of interfaces by simple circuitry is realizable. The command for control over the functional block from the data which the 1st and 2nd additional circuits received from the 1st or 2nd interface control part, It has the function to take out data etc. or to change into the format of the 1st or 2nd interface control part the data received from the functional block, and control information. The speed difference between the 1st or 2nd interface control part and a functional block Buffer processing, It has the function to absorb by WAIT operation etc. or to change the difference of bus signal form between the 1st or 2nd interface control part and a functional block with a parallel/serial-conversion machine etc.

[0022]Furthermore, it has a switching means which a PC card of this invention chooses either of the 1st and 2nd interface parts, and is connected to a functional block. Furthermore, a switching means has a signal wire switching part to which either and common signal lines of the 1st signal wire and the 2nd signal wire are electrically connected. The 1st power supply voltage by which a signal wire switching part is supplied to the 1st interface part from the 1st information processing equipment, Based on the 2nd power supply voltage supplied to the 2nd interface part, common signal lines are electrically connected only to the 2nd either one of 1st

signal wire or signal wire from the 2nd information processing equipment. A signal wire switching part has a switching circuit which chooses either of the 1st signal wire or the 2nd signal wire electrically connected to common signal lines, when both sides of the 1st power supply voltage and the 2nd power supply voltage are supplied. In a PC card of this invention, a signal wire switching part makes relatively either of the 1st signal wire or the 2nd signal wire which is not electrically connected to common signal lines a high impedance state.

[0023] Thus, when data transfer is carried out between a functional block and the 1st or 2nd interface part via common signal lines in this invention, Since a high impedance state can be made to maintain a signal wire by the side of an interface part which should be made a non-active state which does not perform data transfer, Data which should be transmitted can be made to transmit to a signal wire between functional blocks easily and certainly the interface part side which performs data transfer now.

[0024] Since a signal wire switching part has a switching circuit which chooses either of the 1st signal wire or the 2nd signal wire electrically connected to common signal lines when both sides of the 1st power supply voltage and the 2nd power supply voltage are supplied, Even if a PC card is connected to both sides of the 1st and 2nd information processing equipments, connection can be changed comparatively easily and data transfer can be performed to the 1st and 2nd information processing equipments by turns. Since it can recognize from software which operates with information processing equipment in an interface without a dynamic setting-out means by plug and play, being able to apply it, it is satisfactory.

[0025] In a PC card of this invention, a switching means controls voltage supplied to the 1st interface part and 2nd interface part, and it has a control circuit which makes either of the 1st and 2nd interface parts a non-active state.

[0026] When the state where both the 1st interface part and the 2nd interface part were connected to the 1st information processing equipment and 2nd information processing equipment, respectively arises according to this invention, Since one of interface parts can be made into an activated state and an interface part of the other can be made into a high impedance state, Data which should be transmitted can be made to transmit easily and certainly the interface part side of an activated state in the case of data transfer between functional blocks now.

[0027] In the PC card of this invention, the 2nd interface part is characterized by supporting the USB standard. Or the 2nd interface part is characterized by supporting the IEEE1394 standard. In the PC card of this invention, the functional block is characterized by providing a data storage function to the 1st and 2nd information processing equipments. Or the functional block is characterized by providing a data communication facility to the 1st and 2nd information processing equipments.

[0028]



[Mode for carrying out the invention][A 1st embodiment of this invention] The PC card by a 1st embodiment of this invention is explained using drawing 1. In this embodiment, it explains taking the case of the PC card based on the standard of PCMCIA. Drawing 1 shows the outline composition of PC card 1 inside seen from the plane direction with two or more blocks. As shown in drawing 1, PC card 1 has the functional block 2 which provides a predetermined function to information processing equipment. This functional block 2 can provide information processing equipment now with the function which compounded one or them of various functions, such as a memory function, a modem function, or LAN functions. PC card 1 has the 1st interface part 100 that performs data transfer between portable PC (a graphic display is omitted) and the functional block 2 as the 1st information processing equipment. Here, portable PC which omitted the graphic display assumes that it has PC card interface. Then, in this embodiment the 1st interface part 100, It has a PC card physical layer interface which connects with PC card interface of portable PC physically as the 1st physical layer interface 3, It has PC card interface as the 1st interface control part 4 between the 1st physical layer interface 3 and the functional block 2.

[0029]PC card 1 has the 2nd interface part 101 that performs data transfer between desktop type PC10 as the 2nd information processing equipment, and the functional block 2. Here, desktop type PC10 assumes that it does not have PC card interface. Then, the 2nd interface part 101 has different interface specification from the 1st interface part 100. The 2nd interface part 101 is provided with the following.

The 2nd physical layer interface 6 that connects with desktop type PC10 physically via the connecting cable 11.

The 2nd interface control part 7 provided between the 2nd physical layer interface 6 and the functional block 2.

[0030]The 2nd interface part 101 has the 2nd additional circuit 8 for realizing the control procedure through the 2nd interface control part 7 between desktop type PC10 and the functional block 2. This 2nd additional circuit 8 is formed between the functional block 2 and the 2nd interface control part 7.

[0031]Now, in PC card 1 of this embodiment, two or more signal wires 102, 104, 106, 108, and 110 are connected to the 1st and 2nd interface parts 100 and 101 from the functional block 2. At least some two or more signal wires 102-110 as the common signal lines 106, The 1st signal wire 108 that branches by the tee 112 shown by the figure destructive line, and is connected with the 1st interface control part 4 that is a PC card interface control part of the 1st interface part 100, It is connected to both sides with the 2nd signal wire 110 linked to the 2nd additional circuit 8 of the 2nd interface part 101. The common signal lines 106 and the 1st and 2nd signal wires 108 and 110 in this embodiment, It is used as the data/an address bus line

into which the data signal or address signal which should be transmitted between portable PC (graphic display is omitted) and desktop type PC10 and the functional block 2 flows. The signal wire 104 which connects the signal wire 102 which was shown by the figure destructive line, and which connects the functional block 2 and the 1st interface control part 4, and the functional block 2 and the 2nd additional circuit 8 functions as a controlling signal line with which the control signal for controlling the functional block 2, respectively is transmitted.

[0032]Next, operation of PC card 1 by this embodiment is explained. First, for example, the 2nd interface control part 7 was inputted via the desktop type PC10 to 2nd physical layer interface 6, perform error detection/protocol processing of a serial data signal, or, Control for desktop type PC10 side to carry out device recognition of PC card 1 is performed. In order that the 2nd additional circuit 8 may realize the control procedure through the 2nd interface control part 7 between desktop type PC10 and the functional block 2 at this time, Change into data suitable for the 2nd interface control part 7 the data sent out from the functional block 2, or, The data by which was sent out from desktop type PC10 and parallel conversion was carried out via the 2nd physical layer interface 6 and 2nd interface control part 7, and a command are changed into the form that the functional block 2 can be interpreted, or processing changed into an electric interface suitable for the functional block 2 is performed.

[0033]In using PC card 1 for desktop type PC10, connecting, If desktop type PC10 has a USB (Universal Serial Bus) interface which is becoming the latest de-facto standard, for example, A USB interface is used as the 2nd interface control part, The connector for USB or the entry of the connecting cable for USB can be established in the 2nd physical layer interface 6, PC card 1 and desktop type PC10 can be connected with radio communication equipments, such as the connecting cable 11 or infrared rays, and data transfer can be made to perform now.

[0034]When using PC card 1 with portable PC, it can be used by the same operativity as the conventional PC card by inserting 68 pins of the PC card physical layer interface 3 of PC card 1 in a slot of PC card drive equipment provided in portable PC, and connecting with it.

[0035]Although this embodiment explained to the 1st interface part 100 taking the case of a PC card which has PC card interface based on a standard of PCMCIA, Other already explained PC cards, for example, "Compact Flash" (registered trademark of SanDisk), "Small PC Card", "Minituare Card", It is easy to be natural as an interface used for "SmartMedia (registered trademark of Toshiba Corp.)", "MMC (MultiMedia Card)", and "a memory stick (trademark of Sony Corp.)" is given to the 1st interface part 100.

[0036]Although it branches by the tee 112 and he is trying to connect the common signal lines 106 to the 1st and 2nd interface parts 100 and 101 in the above-mentioned embodiment, The conventional existing functional block 2 and a change of design of the 1st interface part 100 (this example PC card interface) can be reduced as much as possible by this, and the 2nd interface part 101 can be formed now by simple circuitry. As long as it designs the PC card 1

whole newly, it may be made to provide a signal wire by which direct continuation is carried out to the 1st and 2nd interface parts 100 and 101 from the functional block 2, respectively, without using the common signal lines 106.

[0037]PC card 1 shown in drawing 1 has composition of performing data transfer only between the functional block 2 and two information processing equipments via the 1st and 2nd interface parts 100 and 101, and has intention of a memory card in which the functional block 2 has a memory function, etc. When the functional block 2 has a modem function, LAN functions, etc., What is necessary is to provide a connector or a connector mounting mouth corresponding to a modem or LAN in a position (for example, left-hand side) which is different in the 2nd physical layer interface 6 of PC card 1 shown in drawing 1, and just to connect a predetermined signal wire to the connector concerned etc. from the functional block 2. And from information processing equipment, various setup information and procedure can be provided to PC card 1 via the 1st or 2nd interface part 100 and 101, and the functional block 2 can exhibit a desired function now based on those setup information and procedure. At the above-mentioned embodiment, although combination of two interfaces to PC card interface and the 2nd interface part explained, even if it gives many interfaces more to a PC card, it is easy to be natural.

[0038]By PCMCIA specification or a USB standard, as for power supply voltage (Vcc) which operates each circuit of PC card 1 inside, the power supply voltage concerned is supplied via an interface from the host side (the information processing equipment side). For example, what is necessary is making it just make a power supply build in in PC card 1 separately, using an external battery, when connecting PC card 1 by this embodiment to serial ports (RS232C etc.), infrared transmission ports, etc. without a power source wire (IrDA etc.). For example, by converting a connecting cable which has connected a main part and a keyboard of desktop type PC10, and connecting a special connector for power-supply-voltage drawing to the connecting cable concerned, Power supply voltage can be supplied now to PC card 1 from a connecting cable of a keyboard of desktop type PC10. If it does in this way, comparatively big PC card 1 of power consumption is received, for example, From desktop type PC10, it can use making only a power supply supply and PC card 1 of this embodiment can be used now for information processing equipment with small electric supply capability, such as noncommercial audio equipment and information terminal equipment.

[0039]As explained above, a PC card by this embodiment, Since it is constituted so that correspondence in two or more interfaces of not only PC card interface but different specification is possible, Also as opposed to information processing equipment which it not only can use it for information processing equipment which has a connector for PC cards like portable PC or a digital camera, but does not have PC card interface as standard like desktop type PC, It can be used without connecting PC card drive equipment, and the portability of a

PC card which it originally has, and flexibility can be raised further.

[0040][A 2nd embodiment of this invention] Next, a PC card by a 2nd embodiment of this invention is explained using drawing 2. This embodiment as well as a 1st embodiment is described taking the case of a PC card based on a standard of PCMCIA. Drawing 2 shows outline composition of PC card 20 inside seen from a plane direction with two or more blocks. The same mark shall be given to a component which has the same functional operation as a component of PC card 1 by a 1st embodiment shown in drawing 1, and detailed explanation shall be omitted.

[0041]PC card 20 by this embodiment has the feature at a point of having provided a signal switching part as a switching means which chooses either of the 1st and 2nd interface parts 100 and 101, and is connected with the functional block 2. This signal switching part has the multiplexer 21 which electrically connects the common signal lines 106 to the 2nd either one of 1st signal wire 108 or signal wire 110. The multiplexer 21 is arranged at the tee 112 of a signal wire shown in drawing 1. A signal switching part has the multiplexer control circuit provided with the logic 24 for bus selector control which switched 23 and comprised an integrated circuit. The switch 23 and the logic 24 for bus selector control are arranged on the left-hand side of the physical layer interface 6 of \*\*\*\*\* 2. As for two terminals of the switch 23, one terminal is grounded (ground potential) and other terminals are connected to one input terminal of the logic 24 for bus selector control. By pushing in the switching button 118 projected from a case of PC card 20 to a method of outside in PC card 20, both terminals of the switch 23 are connected and it will be in a closed (one) state, By pulling up the switching button 118, both terminals of the switch 23 are opened wide and it will be in an open (OFF) state.

[0042]If arrangement of a power source wire in a PC card is explained here, the power source wire 120 will be connected to a pin terminal to which power-supply-voltage Vcc1 is supplied among terminals of 68 pins of the 1st physical layer interface 3 that is a PC card physical layer interface, It is connected to the functional block 2, and this power source wire 120 supplies electric power to the functional block 2, and it is connected to other input terminals of the logic 24 for bus selector control. On the other hand, power-supply-voltage Vcc2 from the 2nd physical layer interface 6 is supplied to the power source wire 124, and it is connected to the functional block 2, and the power source wire 124 supplies electric power to the functional block 2, and it is connected to an input terminal of further others of the logic 24 for bus selector control. An output terminal of the logic 24 for bus selector control is connected to the bus switch enabling pin BX of the multiplexer 21 by the signal wire 126.

[0043]A signal switching part which has the arrangement configuration which was explained above, Power-supply-voltage Vccof \*\* 1st supplied to 1st interface part 100 from portable PC which omitted graphic display1, Based on power-supply-voltage Vccof \*\* 2nd supplied to 2nd interface part 101 from desktop type PC2, A signal wire of either one of the 1st signal wire 108

or the 2nd signal wire 110 is relatively made into a high impedance state to the common signal lines 106, and a connectionless state is formed electrically, and it operates so that a signal wire of the other may electrically be connected with the common signal lines 106. When power-supply-voltage  $V_{cc1}$  and the 2nd both sides of power-supply-voltage  $V_{cc2}$  are supplied, the switch 23 of a signal wire switching part is used in order to choose either of the 1st signal wire 108 or the 2nd signal wire 110 electrically connected to the common signal lines 106. These will be explained in full detail later.

[0044]Next, operation of PC card 20 by this embodiment is explained. Here, information processing equipment shall be connected to both sides of the 1st and 2nd interface parts 100 and 101. That is, the 1st physical layer interface 3 is inserted in a slot of PC card drive equipment of abridged portable PC, and a graphic display the 2nd physical layer interface 6, For example, as shown in drawing 1, it shall be connected to a connector for USB of desktop type PC via the connecting cable 11. In such a case, it will be necessary to choose whether which information processing equipment and PC card 20 are made to perform data transfer. When carrying out data transfer by one interface part, it is required to make it not influenced by an interface part of another side.

[0045]For this reason, it is necessary to hold the 2nd signal wire 110 connected to the 2nd additional circuit 8 to a high impedance state to the 1st interface control 4 in the state where the 2nd interface control part 7 and 2nd additional circuit 8 are not used. Or in the state where the 1st interface control 4 is not used conversely, the 1st signal wire 108 connected to the 1st interface control 4 needs to be held to the 2nd additional circuit 8 at a high impedance state.

[0046]If high (H) voltage is impressed to the bus switch enabling pin BX of the multiplexer 21, that is, a signal "1" is outputted to it from the logic 24 for bus selector control, the multiplexer 21 of this embodiment, The 2nd signal wire 110 side is made into a high impedance state, and the common signal lines 106 from the functional block 2 are connected to the 1st signal wire 108 by the side of the 1st interface control 4. When low (L) voltage is impressed to the bus switch enabling pin BX, that is, a signal "0" is outputted to it from the logic 24 for bus selector control, the multiplexer 21, The 1st signal wire 108 side is made into a high impedance state, and the common signal lines 106 are connected to the 2nd signal wire 110 by the side of the 2nd additional circuit 8. A truth value table showing operation of this logic 24 for bus selector control is shown in Table 1.

[0047]

[Table 1]

選択されるインタフェース	②	①	②	①
Vcc1	0	1	1	1
Vcc2	1	0	1	1
SW	x	x	L	HiZ
OUT	0	1	0	1

表1 バスセクタ・制御用ロジックの真理値表

[0048]In Table 1, \*\* shows the 1st interface part 100 and \*\* shows the 2nd interface part 101. "SW" shows a level of a switching signal inputted into the logic 24 for bus selector control, "L" changes the switch 23 into a closed (one) state, ground voltage is impressed, it is shown that it is a low state, "HiZ" changes the switch 23 into an open (OFF) state, and it is shown that it is a high state (high impedance state). When portable PC to power-supply-voltage Vcc1 is inputted and power-supply-voltage Vcc2 is inputted from a connecting cable for above-mentioned keyboards from a connector for USB of desktop type PC so that clearly from this truth value table, If the switch 23 is carried out to one and an input (SW) of the logic 24 for bus selector control is made into a low state (L), a signal "0" will be outputted to an output terminal (OUT), If the switch 23 is turned OFF and an input (SW) of the logic 24 for bus selector control is made into a high state (HiZ), a signal "1" will be outputted to an output terminal (OUT).

[0049]Irrespective of whether the switch 23 is in a low state, or it is in a high state, from the output terminal (OUT) of the logic 24 for bus selector control. if Vcc1 is impressed and Vcc2 is not impressed, the signal "1" is outputted, Vcc2 is impressed conversely, and Vcc1 impresses - it has -- it can kick -- the signal "0" is outputted.

[0050]Therefore, in the opened state which the switch 23 showed to drawing 2, the 1st [ of PC card 20 ] physical layer interface 3 side is inserted in the slot of the PC card drive equipment of portable PC, If the 2nd physical layer interface 6 is connected to the connector for USB of desktop type PC10 by the connecting cable 11 as shown in drawing 1, Power-supply-voltage Vcc2 is inputted into the logic 24 for bus selector control via the desktop type PC10 to 2nd physical layer interface 6. Since the switch 23 is an opened state, the input (SW) of the logic 24 for bus selector control will be in a high state (HiZ), the signal "1" is outputted to an output terminal (OUT), and it is inputted into the bus switch enabling pin BX of the multiplexer 21. The multiplexer 21 makes the 2nd additional circuit 8 side a hi-z state, in order to change connection of the common signal lines 106 from the functional block 2 to the 1st interface control 4 side. Although data can be sent and received from portable PC to PC card 20, it can avoid accessing from desktop type PC to PC card 20, even if PC card 20 is connected to the both sides of portable PC and desktop type PC by this.

[0051]What is necessary is just to make the switch 23 into a closed state (one) from this state, in order for desktop type PC to enable it to access PC card 20. The input (SW) of the logic 24 for bus selector control will be in a low state (L) by this, the signal "0" is outputted to an output terminal (OUT), and it is inputted into the bus switch enabling pin BX of the multiplexer 21. The multiplexer 21 makes the 1st interface control 4 side a hi-z state, in order to change connection of the common signal lines 106 from the functional block 2 to the 2nd additional circuit 8 side. PC card 20 will be in a connectable state to desktop type PC connected to the 2nd physical layer interface 6, and it becomes impossible to access PC card 20 from portable PC thereby. Since it can recognize from the software which operates with information processing equipment in an interface without the dynamic setting-out means by plug and play, being able to apply it, it is satisfactory.

[0052][A 3rd embodiment of this invention] Next, the PC card by a 3rd embodiment of this invention is explained using drawing 3. This embodiment as well as 1st and 2nd embodiments is described taking the case of the PC card based on the standard of PCMCIA. Drawing 3 shows the outline composition of PC card 30 inside seen from the plane direction with two or more blocks. The same mark shall be given to the component which has the same functional operation as the component of PC cards 1 and 20 by 1st and 2nd embodiments shown in drawing 1 and drawing 2, and detailed explanation shall be omitted. In drawing 3, the graphic display of the signal wire (a controlling signal line is included) connected to the common signal lines and the 1st and 2nd interface parts 100 and 101 from the functional block 2 is omitted.

[0053]PC card 30 by this embodiment has the feature at the point of having formed the control circuit 31 as a switching means which chooses either of the 1st and 2nd interface parts 100 and 101, and is connected to the functional block 2. This control circuit 31 controls voltage Vcc1-in and Vcc2-in which are supplied to the 1st interface part 100 and 2nd interface part 101, It is characterized by operating so that either of the 1st and 2nd interface parts 100 and 101 may be made into a non-active state. The 1st interface part 100 of PC card 30 by this embodiment has the 1st additional circuit 5 between the 1st interface control part 4 and the functional block 2.

[0054]In drawing 3, it is shown that power-supply-voltage Vcc1 from the 1st interface control 4 inputs the illustrated voltage "Vcc1-in" into the control circuit 31. It is shown that the notation "in" and "out" show the input of the control circuit 31 and an output, for example, power-supply-voltage Vcc1 inputs "Vcc1-in" into the control circuit 31, and "Vcc1-out" shows that power-supply-voltage Vcc1 is outputted from the control circuit 31.

[0055]The control circuit 31 in this embodiment will output voltage Vcc1 and VccF, if power-supply-voltage Vcc1 is inputted, and if power-supply-voltage Vcc2 is inputted, it will output voltage Vcc2 and VccF. And when the both sides of the power supply voltage Vcc1 and Vcc2 are inputted, it is constituted so that Vcc1 and VccF may be outputted. VccF is voltage



supplied to the functional block 2.

[0056]If PC card 30 is inserted in the slot of the PC card drive equipment of portable PC, power-supply-voltage Vcc1 will be inputted into the control circuit 31 from the 1st interface control 4. Power-supply-voltage Vcc1 is outputted from the control circuit 31 to the 1st additional circuit 5 by this, and the power supply voltage VccF is outputted to the functional block 2. Thereby, the functional block 2 and the 1st additional circuit 5 will be in an active state, and can access PC card 30 now from portable PC.

[0057]When PC card 30 is not inserted in the slot of the PC card drive equipment of portable PC but the 2nd physical layer interface 6 is connected with the USB connector of desktop type PC, power-supply-voltage Vcc2 inputs into the control circuit 31 from the 2nd interface control part 7. Power-supply-voltage Vcc2 is outputted from the control circuit 31 to the 2nd additional circuit 8 by this, and the power supply voltage VccF is outputted to the functional block 2. Thereby, the functional block 2 and the 2nd additional circuit 8 will be in an active state, and can access PC card 30 now from desktop type PC.

[0058]PC card 30 is inserted in the slot of the PC card drive equipment of portable PC, When the 2nd physical layer interface 6 is connected to the USB connector of desk TOBBU type PC, power-supply-voltage Vcc1 will be inputted into the control circuit 31 from the 1st interface control 4, and power-supply-voltage Vcc2 will be inputted from the 2nd interface control part 7. Since the control circuit 31 outputs power-supply-voltage Vcc1 to the 1st additional circuit 5 as mentioned above at this time and the power supply voltage VccF is outputted to the functional block 2, the functional block 2 and the 1st additional circuit 5 will be in an active state, and the 2nd interface part 101 will be in a non-active state.

[0059]Thus, when data transfer is carried out in this embodiment between the functional block 2 and the 1st or 2nd interface part 100 and 101, Since the control circuit 31 which supplies electric power only to the mechanism block 2 the interface part side which performs data transfer was formed without supplying electric power to the interface part side which should be made the non-active state which does not perform data transfer, The data which should be transmitted can be made to transmit easily and certainly now, and the activity of an interface and non-activity can be changed [ rather than ] with easy composition using a multiplexer with complicated composition.

[0060]In the above-mentioned embodiment, when information processing equipment was connected to the both sides of the 1st and 2nd interface parts 100 and 101, had decided that the right to access was granted to the information processing equipment connected to the 1st interface part 100, but. May constitute so that the information processing equipment which is not restricted to this, of course, for example, is connected previously in time may have PC card 30 and a preference to access, and, It is easy to be natural even if a user changes connection arbitrarily even if a switching circuit as shown in a 2nd embodiment is provided and PC card 30

is connected to the both sides of portable PC and desktop type PC, and it enables it to perform data transfer to portable PC and desktop type PC by turns.

[0061][A 4th embodiment of this invention] Next, the PC card by a 4th embodiment of this invention is explained using drawing 4. This embodiment explains in recent years taking the case of the PCMCIA ATA (AT Attachment) card currently widely used as an archive medium of a digital still camera or a personal digital assistant. Drawing 4 shows the outline composition of PC card 40 inside seen from the plane direction with two or more blocks.

[0062]In drawing 4, the 1st interface part 100 has the PCMCIA ATA interface 45 with the PC card physical layer interface 42. On the other hand, the 2nd interface part 101 has the USB physical layer interface 43, USB interface 44, and the IDE (Integrated Drive Electronics) interface 47. And these 1st and 2nd interface parts 100 and 101 are connected to the flash plate controller 46.

[0063]The common signal lines A which are data/address line among two or more signal wires A and B by which PC card physical layer interface 42 HE connection was made from the PCMCIA ATA interface 45 branch, and are connected also to USB interface 44. By connecting with the USB port of desktop type PC via the USB physical layer interface 43 and a connecting cable from USB interface 44, desktop type PC can access now PC card (PCMCIA ATA card) 40.

[0064]As shown in drawing 4, the flash memory 41-1, 41-2, and 41-3 are provided in PC card 40. These flash memories 41-1, 41-2, and 41-3 are connected to the flash plate controller 46 formed between the flash memory 41-3, and the PCMCIA ATA interface 45 and IDE interface 47 with the controlling signal line C. The USB line driver / receiver 44-1, the IDE command decoder 44-2, and the IDE host interface 44-3 are formed in USB interface 44.

[0065]A driver/receiver is formed in the PCMCIA ATA interface 45, and the non-common signal lines B which are not shared with the common signal lines A shared with IDE interface 44-3 among the signal wires from the PC card physical layer interface 42 are connected. The flash plate controller 46 functions as a PC card interface, The input signal inputted into the common signal lines A and the non-common signal lines B is decoded, Based on the decoded input signal, perform processing to the flash memory 41-1 to 41-3 via the controlling signal line C, or, The control signal transmitted via the common signal lines A based on the decoded result by the IDE command decoder 44-2 performs processing to the flash memory 41-1 to 41-3. Here, the signal wire of USB interface 44 is explained using Table 2. As shown in Table 2, as for the signal wire of USB interface 44, a total of power-supply-voltage Vcc=5V, signal wire for data D+ of a differential, D-, and four earthing conductors is provided. The USB physical layer interface 43 of PC card 40 has two connection ports for serial connection with other peripheral equipment.

[0066]

[Table 2]

V B u s	公称 5 V
D +	データ ( + )
D -	データ ( - )
G N D	g r o u n d

表 2 U S B インタフェース信号線仕様

[0067]If this PC card 40 is inserted in the slot of the PC card drive equipment of portable PC, a control signal will be transmitted via the PC card physical layer interface 42. The control signal shared with the IDE host interface 44-3 among this control signal is sent out to the common signal lines A, and the control signal which is not shared is sent out to the non-common signal lines B. The control signal sent out to the common signal lines A and the non-common signal lines B is decoded by the flash plate controller 46 via the PCMCIA ATA interface 45, and processing according to the decoded control signal is performed in the flash memory 41-1 to 41-3. The data in the flash memory 41-1 to 41-3 obtained as a result of processing is transmitted to the PCMCIA ATA interface 45 from the flash plate controller 46, and is sent out to portable PC via the PC card physical layer interface 42. Thus, PC card 40 can be operated as a PCMCIA ATA card.

[0068]On the other hand, when the connector of the USB connecting cable connected to the USB port of desktop type PC and the USB physical layer interface 43 of PC card 40 are connected, The control signal (serial signal) from desktop type PC is inputted, it is received by the receiver of a USB line driver / receiver 44-1, and, subsequently serial/parallel conversion of a control signal is performed.

[0069]The control signal changed into the parallel signal is decoded by the IDE command decoder 44-2, and is outputted to the common signal lines A via the IDE host interface 44-3. The control signal outputted to the common signal lines A is transmitted to the flash plate controller 46 via IDE interface 47, and predetermined processing is performed to the flash memory 41-1 to 41-3. It can be made to operate by operation explained above as an IDE drive by which PC card 40 was connected to the USB port of desktop type PC now.

[0070]Also in PC card 40 by this embodiment, the connection with information processing equipment can also make connection by radio including infrared ray communication, and it is also possible to acquire a power source wire from the connecting cable of the keyboard of desktop type PC. Although it explained by the case where the 2nd interface part 101 supports the USB standard, in the PC card by the above 1st thru/or a 4th embodiment, For example, if desktop type PC has the interface and connector corresponding to an IEEE1394 standard, It is easy to be natural even if it makes the 2nd interface part 101 of PC cards 1, 20, 30, and 40 of the above-mentioned embodiment the interface corresponding to an IEEE1394 standard.

[0071]

[Effect of the Invention]the attachment and detachment which the PC card originally has according to [ above passage ] this invention -- it is easy, and two or more information processing equipments and a connectable PC card can be realized, without spoiling an advantage excellent in flexibility and portability. According to this invention, a PC card connectable also with the information processing equipment which does not have PC card drive equipment is realizable. According to this invention, a PC card connectable with the interface beforehand formed in information processing equipment standardly is realizable.

## TECHNICAL FIELD

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[Field of the Invention] This invention relates to the PC card used for information processing equipments including the personal computer and digital still camera which process a variety of information equipping them with removable.

## PRIOR ART

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[Description of the Prior Art]The personal computer which processes the information on versatility [ PC card ], such as a character, a sound, or picture information. (It is hereafter called PC for short) It is used for information processing equipments including a digital still camera, equipping them removable, and is used for improvement in the throughput of the various processings which information processing equipment performs, or extension of a processing capability.

[0003]A PC card The beginning, In order to create the standard of the memory card for PC. International standardization is carried out based on the common protocol (PC Card Standard) which PCMCIA (Personal Computer Memory Card International Association) which is the provided organization announced, It was used for mainly portable small PC. The physical specification (appearance shape) of a PC card based on the standard of PCMCIA is a card shape with a length of 85.6 mm and a width of 54.0 mm.

It is classified into Type I, Type II, and Type III by difference of thickness.

The two-piece connector which has 68 pins is adopted as the connector of a PC card. A PC card can be drawn out from a PC Card slot, when it is used inserting in the PC Card slot of PC card interface provided in portable PC etc. and does not use the connector concerned for it.

[0004]Thus, since a PC card can be detached and attached easily, and is small and it excels in portability, The use is spreading not only in the semiconductor memory card as an auxiliary storage unit but in communication of the auxiliary storage unit provided with hard disk drives, such as a magnetic disk, or a modem function, a LAN (Local Area Network) function, etc. and the network related field. As an image storage which the field of application for which a PC card is used was also expanded, and it was not restricted to portable small PC, for example, it was used for digital-image-information processing units, such as a digital still camera, was removable, and was excellent in portability, Or it is increasingly used also as a data transfer unit (for example, a LAN card and a modem card) for transmitting the picture memorized to the camera to PC etc.

[0005]In order to give desired throughput and processing capability to information processing equipment conventionally, The substrate which has a predetermined function into an expansion bus slot must be attached, or the built-in board module linked to the mother board of PC must be attached, To having followed difficulty on substitution and the portability of the substrate, if it is a PC card, it has an ease of handling that desired throughput and a function can be immediately obtained only by exchanging the PC card inserted in a PC Card slot. There are a system which inserts the attachment and detachment of a PC card to information processing equipment, and is drawn out, a system placed and fixed, etc.

[0006]PC and the digital still camera which were miniaturized more with development of the

high integration technology of a semiconductor device in recent years, Information processing equipment also including consumer appliances, such as a digital camcorder or portable audio apparatus, is developed, and, in addition to the conventional PC card based on the standard of PCMCIA which meant use to portable PC, the appearance of the PC card miniaturized more came to be demanded. For this reason, the standard of the following small memory cards is advocated now, and it has appeared in a commercial scene as a product actually.

[0007]It is "Compact Flash (registered trademark of SanDisk)" which CFA (Compact Flash Association) advocates [ 1st ] first, The outside dimension of this is small flash memory card with a capacity of about 8 MB in  $36.4 \times 42.8 \times 3.3\text{-mm}^3$ . The 2nd Matsushita Battery Industrial Co., Ltd., Japan Electronic Industry Development Association (JEIDA: Japan Electronic Industry Development Association), it is "Small PC Card" which PCMCIA advocates, and an outside dimension is  $45.0 \times 42.8 \times 5.0\text{-mm}^3$ , and this is a size for the minute of the PC card of the former [ length ] half [ about ]. The 3rd is Miniature Card Implementers Forum and "Miniature Card" by PCMCIA, and the outside dimension of this is a small card of  $38 \times 33 \times 3.5\text{-mm}^3$ .

[0008]It is "SmartMedia (registered trademark of Toshiba Corp.)" of SSFDC Forum the 4th, and the outside dimension of this is a flash EEPROM card with a capacity of 2 MB - about 16 MB in  $37 \times 45 \times 0.67\text{-mm}^3$ . The 5th is "MMC (MultiMedia Card)" which MultiMedia Card Association advocates, and the outside dimension of this is a flash EEPROM card with a capacity of about 10 MB in  $24 \times 32 \times 1.4\text{-mm}^3$ . It is "the memory stick (trademark of Sony Corp.)" which SONY CORPORATION advocates in the 6th, and the outside dimension of this is a flash EEPROM card with a capacity of about 8 MB in  $21.5 \times 50 \times 2.8\text{-mm}^3$ . In addition, the small PC card provided with the hard disk drive by magnetic recording is also developed. In an application concerned, it is named a PC card generically including the small card which has the function explained above, and the card which is similar to these further.

[0009]. The IC card used mainly for the purpose of substituting for a card with a magnetic stripe has the PC card conventionally. For the purpose of making the throughput of PC etc., and a processing capability extend further for the purpose of solving the problem about lack of the compatibility of IC cards, or the limit of a use and expansion nature, it newly decides upon physical specification / electric specification / software specification, and realizes. That is, the PC card differs from such an IC memory card greatly also in respect of the mechanism or the use, though it has the origin in an IC memory card. A PC card can be said to be the expanded-function card realized by being standardized by the electric specification / software specification strongly influenced in the extended bus architecture of PC. Therefore, the field of application and technical field are new Field of the Invention and the technical field which can provide the function which exceeds the commercial-scene field of the range whose intention the IC card had at the beginning you to be Haruka.



## EFFECT OF THE INVENTION

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[Effect of the Invention]the attachment and detachment which the PC card originally has according to [ above passage ] this invention -- it is easy, and two or more information processing equipments and a connectable PC card can be realized, without spoiling an advantage excellent in flexibility and portability. According to this invention, a PC card connectable also with the information processing equipment which does not have PC card drive equipment is realizable. According to this invention, a PC card connectable with the interface beforehand formed in information processing equipment standardly is realizable.

## TECHNICAL PROBLEM

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[Problem to be solved by the invention]now, although it inserts in a slot of PC card interface in which information processing equipments, such as PC and a digital still camera, were equipped with a PC card explained above as carried out, and a predetermined function is demonstrated, For example, how to use a PC card like a host computer system which does not have portability including a desktop type with information processing equipment which has not usually equipped PC card interface as standard is explained below.

[0011]For example, JP,H7-302140,A has disclosed operate a PC card from information processing equipment by inserting a PC card in a slot which prepared an interface unit for PC cards which built in PC card interface, connected the unit concerned to information processing equipment, and was attached to PC card interface.

[0012]Already now as an interface unit for PC cards connectable with desktop type PC, The PC card drive equipment of the type using the parallel port with which PC is equipped standardly, or the type which makes SCSI (Small Computer System Interface) connection, Or the PC card drive equipment of the type which uses an interface board for exclusive use for the PCI slot of PC, etc. inserting it exists. In the PC card drive equipment of parallel port connection or SCSI connection. Although only a memory card can mainly be used among PC cards, all the PC cards are fundamentally usable like PC card interface with which portable small PC is equipped as standard in the drive device using an interface for exclusive use.

[0013]Thus, although it will be necessary to build PC card drive equipment into information processing equipment with the information processing equipment which is not provided with PC card interface using a PC card therefore, some problems arise. It is that the advantage which the PC card of it being as small as the flexibility which can be detached and attached easily to the 1st, and excelling in portability first originally has will be spoiled. For example, the PC card (memory card) which recorded data is removed, carried and moved from information processing equipment (a) with information processing equipment (a) provided with PC card interface, If PC card drive equipment is not attached to information processing equipment (b) when trying to read the contents of the PC card with the information processing equipment (b) at another point, the contents naturally recorded on the PC card concerned cannot be read. In order to avoid this, there is a method of carrying PC card drive equipment together and moving it with a PC card, but now, the portability of a PC card will be spoiled remarkably.

[0014]On the other hand, since only movement of a PC card will be required if PC card drive equipment is beforehand attached to information processing equipment (b), portability is securable, but. When there are two or more information processing equipments (b), it will be necessary to install PC card drive equipment in each equipment (b), and becomes a high cost, and the 2nd problem of not being economical arises. Installation of driver software for

exclusive use and setting out of a board are needed for introducing PC card drive equipment into information processing equipment (b), and the 3rd problem that the control of maintenance of information processing equipment will become troublesome is also produced.

[0015]the attachment and detachment which, as for the purpose of this invention, the PC card originally has -- it is easy, and it is in providing two or more information processing equipments and a connectable PC card, without spoiling an advantage excellent in flexibility and portability. The purpose of this invention is to provide a PC card connectable also with the information processing equipment which does not have PC card drive equipment. The purpose of this invention is to provide a PC card connectable with the interface beforehand formed in information processing equipment standardly.

## MEANS

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[Means for solving problem]The functional block with which the above-mentioned purpose provides a predetermined function to information processing equipment, The 1st interface part that performs data transfer between a functional block and the 1st information processing equipment, It has different interface specification from the 1st interface part, and is attained by the PC card having at least the 2nd interface part that performs data transfer between a functional block and the 2nd information processing equipment.

[0017]In the PC card of this invention, the 1st interface part corresponds to the existing PC card interface, If the 2nd interface part constitutes so that it may correspond to the USB interface of different specification from PC card interface, It not only can use the PC card of this invention for the 1st information processing equipment that has a connector for PC cards like portable PC or a digital camera, but, It can be used also to the 2nd information processing equipment that does not have a connector for PC cards as standard like desktop type PC, without connecting PC card drive equipment, and the portability of a PC card which it originally has, and flexibility can be raised further. The "data transfer" as used in an application concerned shall mean sending and receiving the data of a large concept including the command over not only data but the address and PC card which should be stored in a memory card etc., or the request signal sent to information processing equipment from a PC card.

[0018]This invention is characterized by that a PC card of this invention comprises:

The 1st physical layer interface that connects the 1st interface part with the 1st information processing equipment physically.

The 1st interface control part provided between the 1st physical layer interface and a functional block.

The 1st interface part has the 1st additional circuit for realizing a control procedure through the 1st interface control part between the 1st information processing equipment and a functional block. The 1st additional circuit is provided between a functional block and the 1st interface control part.

[0019]In a PC card of this invention, the 2nd interface part, The 2nd interface control part provided between the 2nd physical layer interface that connects with the 2nd information processing equipment physically, the 2nd physical layer interface, and a functional block It has. The 2nd interface part has the 2nd additional circuit for realizing a control procedure through the 2nd interface control part between the 2nd information processing equipment and a functional block. The 2nd additional circuit is provided between a functional block and the 2nd interface control part.

[0020]In a PC card of this invention, from a functional block, two or more signal wires are connected to the 1st and 2nd interface parts, and at least some two or more signal wires. It is

connected to both sides of the 1st signal wire connected with the 1st interface part via a tee as common signal lines, and the 2nd signal wire linked to the 2nd interface part. Common signal lines are characterized by being the data/address bus line into which a data signal or an address signal which should be transmitted between the 1st and 2nd information processing equipments and a functional block flows.

[0021] Thus, some of two or more signal wires connected to the 1st and 2nd interface parts from a functional block in this invention. Since it is connected to both sides of the 1st interface part and the 2nd interface part via a tee as common signal lines, a PC card which has two or more kinds of interfaces by simple circuitry is realizable. A command for control over a functional block from data which the 1st and 2nd additional circuits received from the 1st or 2nd interface control part, It has the function to take out data etc. or to change into a format of the 1st or 2nd interface control part data received from a functional block, and control information. A speed difference between the 1st or 2nd interface control part and a functional block Buffer processing, It has the function to absorb by WAIT operation etc. or to change a difference of bus signal form between the 1st or 2nd interface control part and a functional block with a parallel/serial-conversion machine etc.

[0022] Furthermore, it has a switching means which the PC card of this invention chooses either of the 1st and 2nd interface parts, and is connected to a functional block. Furthermore, the switching means has a signal wire switching part to which either and common signal lines of the 1st signal wire and the 2nd signal wire are electrically connected. The 1st power supply voltage by which a signal wire switching part is supplied to the 1st interface part from the 1st information processing equipment, Based on the 2nd power supply voltage supplied to the 2nd interface part, common signal lines are electrically connected only to the 2nd either one of 1st signal wire or signal wire from the 2nd information processing equipment. The signal wire switching part has a switching circuit which chooses either of the 1st signal wire or the 2nd signal wire electrically connected to common signal lines, when the both sides of the 1st power supply voltage and the 2nd power supply voltage are supplied. In the PC card of this invention, a signal wire switching part makes relatively either of the 1st signal wire or the 2nd signal wire which is not electrically connected to common signal lines a high impedance state.

[0023] Thus, when data transfer is carried out between a functional block and the 1st or 2nd interface part via common signal lines in this invention, Since a high impedance state can be made to maintain the signal wire by the side of the interface part which should be made the non-active state which does not perform data transfer, The data which should be transmitted can be made to transmit to the signal wire between functional blocks easily and certainly the interface part side which performs data transfer now.

[0024] Since a signal wire switching part has a switching circuit which chooses either of the 1st signal wire or the 2nd signal wire electrically connected to common signal lines when both

sides of the 1st power supply voltage and the 2nd power supply voltage are supplied, Even if a PC card is connected to both sides of the 1st and 2nd information processing equipments, connection can be changed comparatively easily and data transfer can be performed to the 1st and 2nd information processing equipments by turns. Since it can recognize from software which operates with information processing equipment in an interface without a dynamic setting-out means by plug and play, being able to apply it, it is satisfactory.

[0025]In a PC card of this invention, a switching means controls voltage supplied to the 1st interface part and 2nd interface part, and it has a control circuit which makes either of the 1st and 2nd interface parts a non-active state.

[0026]When the state where both the 1st interface part and the 2nd interface part were connected to the 1st information processing equipment and 2nd information processing equipment, respectively arises according to this invention, Since one of interface parts can be made into an activated state and an interface part of the other can be made into a high impedance state, Data which should be transmitted can be made to transmit easily and certainly the interface part side of an activated state in the case of data transfer between functional blocks now.

[0027]In the PC card of this invention, the 2nd interface part is characterized by supporting the USB standard. Or the 2nd interface part is characterized by supporting the IEEE1394 standard. In the PC card of this invention, the functional block is characterized by providing a data storage function to the 1st and 2nd information processing equipments. Or the functional block is characterized by providing a data communication facility to the 1st and 2nd information processing equipments.

[0028]

[Mode for carrying out the invention][A 1st embodiment of this invention] The PC card by a 1st embodiment of this invention is explained using drawing 1. In this embodiment, it explains taking the case of the PC card based on the standard of PCMCIA. Drawing 1 shows the outline composition of PC card 1 inside seen from the plane direction with two or more blocks. As shown in drawing 1, PC card 1 has the functional block 2 which provides a predetermined function to information processing equipment. This functional block 2 can provide information processing equipment now with the function which compounded one or them of various functions, such as a memory function, a modem function, or LAN functions. PC card 1 has the 1st interface part 100 that performs data transfer between portable PC (a graphic display is omitted) and the functional block 2 as the 1st information processing equipment. Here, portable PC which omitted the graphic display assumes that it has PC card interface. Then, in this embodiment the 1st interface part 100, It has a PC card physical layer interface which connects with PC card interface of portable PC physically as the 1st physical layer interface 3, It has PC card interface as the 1st interface control part 4 between the 1st physical layer

interface 3 and the functional block 2.

[0029]PC card 1 has the 2nd interface part 101 that performs data transfer between desktop type PC10 as the 2nd information processing equipment, and the functional block 2. Here, desktop type PC10 assumes that it does not have PC card interface. Then, the 2nd interface part 101 has different interface specification from the 1st interface part 100. The 2nd interface part 101 is provided with the following.

The 2nd physical layer interface 6 that connects with desktop type PC10 physically via the connecting cable 11.

The 2nd interface control part 7 provided between the 2nd physical layer interface 6 and the functional block 2.

[0030]The 2nd interface part 101 has the 2nd additional circuit 8 for realizing the control procedure through the 2nd interface control part 7 between desktop type PC10 and the functional block 2. This 2nd additional circuit 8 is formed between the functional block 2 and the 2nd interface control part 7.

[0031]Now, in PC card 1 of this embodiment, two or more signal wires 102, 104, 106, 108, and 110 are connected to the 1st and 2nd interface parts 100 and 101 from the functional block 2. At least some two or more signal wires 102-110 as the common signal lines 106, The 1st signal wire 108 that branches by the tee 112 shown by the figure destructive line, and is connected with the 1st interface control part 4 that is a PC card interface control part of the 1st interface part 100, It is connected to both sides with the 2nd signal wire 110 linked to the 2nd additional circuit 8 of the 2nd interface part 101. The common signal lines 106 and the 1st and 2nd signal wires 108 and 110 in this embodiment, It is used as the data/an address bus line into which the data signal or address signal which should be transmitted between portable PC (graphic display is omitted) and desktop type PC10 and the functional block 2 flows. The signal wire 104 which connects the signal wire 102 which was shown by the figure destructive line, and which connects the functional block 2 and the 1st interface control part 4, and the functional block 2 and the 2nd additional circuit 8 functions as a controlling signal line with which the control signal for controlling the functional block 2, respectively is transmitted.

[0032]Next, operation of PC card 1 by this embodiment is explained. First, for example, the 2nd interface control part 7 was inputted via the desktop type PC10 to 2nd physical layer interface 6, perform error detection/protocol processing of a serial data signal, or, Control for desktop type PC10 side to carry out device recognition of PC card 1 is performed. In order that the 2nd additional circuit 8 may realize the control procedure through the 2nd interface control part 7 between desktop type PC10 and the functional block 2 at this time, Change into data suitable for the 2nd interface control part 7 the data sent out from the functional block 2, or, The data by which was sent out from desktop type PC10 and parallel conversion was carried

out via the 2nd physical layer interface 6 and 2nd interface control part 7, and a command are changed into the form that the functional block 2 can be interpreted, or processing changed into an electric interface suitable for the functional block 2 is performed.

[0033]In using PC card 1 for desktop type PC10, connecting, If desktop type PC10 has a USB (Universal Serial Bus) interface which is becoming the latest de-facto standard, for example, A USB interface is used as the 2nd interface control part, The connector for USB or the entry of the connecting cable for USB can be established in the 2nd physical layer interface 6, PC card 1 and desktop type PC10 can be connected with radio communication equipments, such as the connecting cable 11 or infrared rays, and data transfer can be made to perform now.

[0034]When using PC card 1 with portable PC, it can be used by the same operativity as the conventional PC card by inserting 68 pins of the PC card physical layer interface 3 of PC card 1 in a slot of PC card drive equipment provided in portable PC, and connecting with it.

[0035]Although this embodiment explained to the 1st interface part 100 taking the case of a PC card which has PC card interface based on a standard of PCMCIA, Other already explained PC cards, for example, "Compact Flash" (registered trademark of SanDisk), "Small PC Card", "Minituare Card", It is easy to be natural as an interface used for "SmartMedia (registered trademark of Toshiba Corp.)", "MMC (MultiMedia Card)", and "a memory stick (trademark of Sony Corp.)" is given to the 1st interface part 100.

[0036]Although it branches by the tee 112 and he is trying to connect the common signal lines 106 to the 1st and 2nd interface parts 100 and 101 in the above-mentioned embodiment, The conventional existing functional block 2 and a change of design of the 1st interface part 100 (this example PC card interface) can be reduced as much as possible by this, and the 2nd interface part 101 can be formed now by simple circuitry. As long as it designs the PC card 1 whole newly, it may be made to provide a signal wire by which direct continuation is carried out to the 1st and 2nd interface parts 100 and 101 from the functional block 2, respectively, without using the common signal lines 106.

[0037]PC card 1 shown in drawing 1 has composition of performing data transfer only between the functional block 2 and two information processing equipments via the 1st and 2nd interface parts 100 and 101, and has intention of a memory card in which the functional block 2 has a memory function, etc. When the functional block 2 has a modem function, LAN functions, etc., What is necessary is to provide a connector or a connector mounting mouth corresponding to a modem or LAN in a position (for example, left-hand side) which is different in the 2nd physical layer interface 6 of PC card 1 shown in drawing 1, and just to connect a predetermined signal wire to the connector concerned etc. from the functional block 2. And from information processing equipment, various setup information and procedure can be provided to PC card 1 via the 1st or 2nd interface part 100 and 101, and the functional block 2 can exhibit a desired function now based on those setup information and procedure. At the



above-mentioned embodiment, although combination of two interfaces to PC card interface and the 2nd interface part explained, even if it gives many interfaces more to a PC card, it is easy to be natural.

[0038]By PCMCIA specification or a USB standard, as for power supply voltage (Vcc) which operates each circuit of PC card 1 inside, the power supply voltage concerned is supplied via an interface from the host side (the information processing equipment side). For example, what is necessary is making it just make a power supply build in in PC card 1 separately, using an external battery, when connecting PC card 1 by this embodiment to serial ports (RS232C etc.), infrared transmission ports, etc. without a power source wire (IrDA etc.). For example, by converting a connecting cable which has connected a main part and a keyboard of desktop type PC10, and connecting a special connector for power-supply-voltage drawing to the connecting cable concerned, Power supply voltage can be supplied now to PC card 1 from a connecting cable of a keyboard of desktop type PC10. If it does in this way, comparatively big PC card 1 of power consumption is received, for example, From desktop type PC10, it can use making only a power supply supply and PC card 1 of this embodiment can be used now for information processing equipment with small electric supply capability, such as noncommercial audio equipment and information terminal equipment.

[0039]As explained above, a PC card by this embodiment, Since it is constituted so that correspondence in two or more interfaces of not only PC card interface but different specification is possible, Also as opposed to information processing equipment which it not only can use it for information processing equipment which has a connector for PC cards like portable PC or a digital camera, but does not have PC card interface as standard like desktop type PC, It can be used without connecting PC card drive equipment, and the portability of a PC card which it originally has, and flexibility can be raised further.

[0040][A 2nd embodiment of this invention] Next, a PC card by a 2nd embodiment of this invention is explained using drawing 2. This embodiment as well as a 1st embodiment is described taking the case of a PC card based on a standard of PCMCIA. Drawing 2 shows outline composition of PC card 20 inside seen from a plane direction with two or more blocks. The same mark shall be given to a component which has the same functional operation as a component of PC card 1 by a 1st embodiment shown in drawing 1, and detailed explanation shall be omitted.

[0041]PC card 20 by this embodiment has the feature at a point of having provided a signal switching part as a switching means which chooses either of the 1st and 2nd interface parts 100 and 101, and is connected with the functional block 2. This signal switching part has the multiplexer 21 which electrically connects the common signal lines 106 to the 2nd either one of 1st signal wire 108 or signal wire 110. The multiplexer 21 is arranged at the tee 112 of a signal wire shown in drawing 1. A signal switching part has the multiplexer control circuit provided

with the logic 24 for bus selector control which switched 23 and comprised an integrated circuit. The switch 23 and the logic 24 for bus selector control are arranged on the left-hand side of the physical layer interface 6 of \*\*\*\*\* 2. As for two terminals of the switch 23, one terminal is grounded (ground potential) and other terminals are connected to one input terminal of the logic 24 for bus selector control. By pushing in the switching button 118 projected from a case of PC card 20 to a method of outside in PC card 20, both terminals of the switch 23 are connected and it will be in a closed (one) state, By pulling up the switching button 118, both terminals of the switch 23 are opened wide and it will be in an open (OFF) state.

[0042]If arrangement of a power source wire in a PC card is explained here, the power source wire 120 will be connected to a pin terminal to which power-supply-voltage Vcc1 is supplied among terminals of 68 pins of the 1st physical layer interface 3 that is a PC card physical layer interface, It is connected to the functional block 2, and this power source wire 120 supplies electric power to the functional block 2, and it is connected to other input terminals of the logic 24 for bus selector control. On the other hand, power-supply-voltage Vcc2 from the 2nd physical layer interface 6 is supplied to the power source wire 124, and it is connected to the functional block 2, and the power source wire 124 supplies electric power to the functional block 2, and it is connected to an input terminal of further others of the logic 24 for bus selector control. An output terminal of the logic 24 for bus selector control is connected to the bus switch enabling pin BX of the multiplexer 21 by the signal wire 126.

[0043]A signal switching part which has the arrangement configuration which was explained above, Power-supply-voltage Vccof \*\* 1st supplied to 1st interface part 100 from portable PC which omitted graphic display1, Based on power-supply-voltage Vccof \*\* 2nd supplied to 2nd interface part 101 from desktop type PC2, A signal wire of either one of the 1st signal wire 108 or the 2nd signal wire 110 is relatively made into a high impedance state to the common signal lines 106, and a connectionless state is formed electrically, and it operates so that a signal wire of the other may electrically be connected with the common signal lines 106. When power-supply-voltage Vccof \*\* 1st1 and the 2nd both sides of power-supply-voltage Vcc2 are supplied, the switch 23 of a signal wire switching part is used in order to choose either of the 1st signal wire 108 or the 2nd signal wire 110 electrically connected to the common signal lines 106. These will be explained in full detail later.

[0044]Next, operation of PC card 20 by this embodiment is explained. Here, information processing equipment shall be connected to the both sides of the 1st and 2nd interface parts 100 and 101. That is, the 1st physical layer interface 3 is inserted in the slot of the PC card drive equipment of abridged portable PC, and a graphic display the 2nd physical layer interface 6, For example, as shown in drawing 1, it shall be connected to the connector for USB of desktop type PC via the connecting cable 11. In such a case, it will be necessary to choose whether which information processing equipment and PC card 20 are made to perform

data transfer. When carrying out data transfer by one interface part, it is required to make it not influenced by the interface part of another side.

[0045]For this reason, it is necessary to hold the 2nd signal wire 110 connected to the 2nd additional circuit 8 to a high impedance state to the 1st interface control 4 in the state where the 2nd interface control part 7 and 2nd additional circuit 8 are not used. Or in the state where the 1st interface control 4 is not used conversely, the 1st signal wire 108 connected to the 1st interface control 4 needs to be held to the 2nd additional circuit 8 at a high impedance state.

[0046]If high (H) voltage is impressed to the bus switch enabling pin BX of the multiplexer 21, that is, a signal "1" is outputted to it from the logic 24 for bus selector control, the multiplexer 21 of this embodiment, The 2nd signal wire 110 side is made into a high impedance state, and the common signal lines 106 from the functional block 2 are connected to the 1st signal wire 108 by the side of the 1st interface control 4. When low (L) voltage is impressed to the bus switch enabling pin BX, that is, a signal "0" is outputted to it from the logic 24 for bus selector control, the multiplexer 21, The 1st signal wire 108 side is made into a high impedance state, and the common signal lines 106 are connected to the 2nd signal wire 110 by the side of the 2nd additional circuit 8. A truth value table showing operation of this logic 24 for bus selector control is shown in Table 1.

[0047]

[Table 1]

選択されるインターフェース	②	①	②	①
Vcc1	0	1	1	1
Vcc2	1	0	1	1
SW	x	x	L	HiZ
OUT	0	1	0	1

表1 バスセクタ・制御用ロジックの真理値表

[0048]In Table 1, \*\* shows the 1st interface part 100 and \*\* shows the 2nd interface part 101. "SW" shows a level of a switching signal inputted into the logic 24 for bus selector control, "L" changes the switch 23 into a closed (one) state, ground voltage is impressed, it is shown that it is a low state, "HiZ" changes the switch 23 into an open (OFF) state, and it is shown that it is a high state (high impedance state). When portable PC to power-supply-voltage Vcc1 is inputted and power-supply-voltage Vcc2 is inputted from a connecting cable for above-mentioned keyboards from a connector for USB of desktop type PC so that clearly from this truth value table, If the switch 23 is carried out to one and an input (SW) of the logic 24 for bus selector control is made into a low state (L), a signal "0" will be outputted to an output terminal (OUT), If

the switch 23 is turned OFF and an input (SW) of the logic 24 for bus selector control is made into a high state (HiZ), a signal "1" will be outputted to an output terminal (OUT).

[0049]Irrespective of whether the switch 23 is in a low state, or it is in a high state, from the output terminal (OUT) of the logic 24 for bus selector control. if Vcc1 is impressed and Vcc2 is not impressed, the signal "1" is outputted, Vcc2 is impressed conversely, and Vcc1 impresses - it has -- it can kick -- the signal "0" is outputted.

[0050]Therefore, in the opened state which the switch 23 showed to drawing 2, the 1st [ of PC card 20 ] physical layer interface 3 side is inserted in the slot of the PC card drive equipment of portable PC, If the 2nd physical layer interface 6 is connected to the connector for USB of desktop type PC10 by the connecting cable 11 as shown in drawing 1, Power-supply-voltage Vcc2 is inputted into the logic 24 for bus selector control via the desktop type PC10 to 2nd physical layer interface 6. Since the switch 23 is an opened state, the input (SW) of the logic 24 for bus selector control will be in a high state (HiZ), the signal "1" is outputted to an output terminal (OUT), and it is inputted into the bus switch enabling pin BX of the multiplexer 21. The multiplexer 21 makes the 2nd additional circuit 8 side a hi-z state, in order to change connection of the common signal lines 106 from the functional block 2 to the 1st interface control 4 side. Although data can be sent and received from portable PC to PC card 20, it can avoid accessing from desktop type PC to PC card 20, even if PC card 20 is connected to the both sides of portable PC and desktop type PC by this.

[0051]What is necessary is just to make the switch 23 into a closed state (one) from this state, in order for desktop type PC to enable it to access PC card 20. The input (SW) of the logic 24 for bus selector control will be in a low state (L) by this, the signal "0" is outputted to an output terminal (OUT), and it is inputted into the bus switch enabling pin BX of the multiplexer 21. The multiplexer 21 makes the 1st interface control 4 side a hi-z state, in order to change connection of the common signal lines 106 from the functional block 2 to the 2nd additional circuit 8 side. PC card 20 will be in a connectable state to desktop type PC connected to the 2nd physical layer interface 6, and it becomes impossible to access PC card 20 from portable PC thereby. Since it can recognize from the software which operates with information processing equipment in an interface without the dynamic setting-out means by plug and play, being able to apply it, it is satisfactory.

[0052][A 3rd embodiment of this invention] Next, the PC card by a 3rd embodiment of this invention is explained using drawing 3. This embodiment as well as 1st and 2nd embodiments is described taking the case of the PC card based on the standard of PCMCIA. Drawing 3 shows the outline composition of PC card 30 inside seen from the plane direction with two or more blocks. The same mark shall be given to the component which has the same functional operation as the component of PC cards 1 and 20 by 1st and 2nd embodiments shown in drawing 1 and drawing 2, and detailed explanation shall be omitted. In drawing 3, the graphic

display of the signal wire (a controlling signal line is included) connected to the common signal lines and the 1st and 2nd interface parts 100 and 101 from the functional block 2 is omitted.

[0053]PC card 30 by this embodiment has the feature at the point of having formed the control circuit 31 as a switching means which chooses either of the 1st and 2nd interface parts 100 and 101, and is connected to the functional block 2. This control circuit 31 controls voltage Vcc1-in and Vcc2-in which are supplied to the 1st interface part 100 and 2nd interface part 101, It is characterized by operating so that either of the 1st and 2nd interface parts 100 and 101 may be made into a non-active state. The 1st interface part 100 of PC card 30 by this embodiment has the 1st additional circuit 5 between the 1st interface control part 4 and the functional block 2.

[0054]In drawing 3, it is shown that power-supply-voltage Vcc1 from the 1st interface control 4 inputs the illustrated voltage "Vcc1-in" into the control circuit 31. It is shown that the notation "in" and "out" show the input of the control circuit 31 and an output, for example, power-supply-voltage Vcc1 inputs "Vcc1-in" into the control circuit 31, and "Vcc1-out" shows that power-supply-voltage Vcc1 is outputted from the control circuit 31.

[0055]The control circuit 31 in this embodiment will output voltage Vcc1 and VccF, if power-supply-voltage Vcc1 is inputted, and if power-supply-voltage Vcc2 is inputted, it will output voltage Vcc2 and VccF. And when the both sides of the power supply voltage Vcc1 and Vcc2 are inputted, it is constituted so that Vcc1 and VccF may be outputted. VccF is voltage supplied to the functional block 2.

[0056]If PC card 30 is inserted in the slot of the PC card drive equipment of portable PC, power-supply-voltage Vcc1 will be inputted into the control circuit 31 from the 1st interface control 4. Power-supply-voltage Vcc1 is outputted from the control circuit 31 to the 1st additional circuit 5 by this, and the power supply voltage VccF is outputted to the functional block 2. Thereby, the functional block 2 and the 1st additional circuit 5 will be in an active state, and can access PC card 30 now from portable PC.

[0057]When PC card 30 is not inserted in the slot of the PC card drive equipment of portable PC but the 2nd physical layer interface 6 is connected with the USB connector of desktop type PC, power-supply-voltage Vcc2 inputs into the control circuit 31 from the 2nd interface control part 7. Power-supply-voltage Vcc2 is outputted from the control circuit 31 to the 2nd additional circuit 8 by this, and the power supply voltage VccF is outputted to the functional block 2. Thereby, the functional block 2 and the 2nd additional circuit 8 will be in an active state, and can access PC card 30 now from desktop type PC.

[0058]PC card 30 is inserted in the slot of the PC card drive equipment of portable PC, When the 2nd physical layer interface 6 is connected to the USB connector of desk TOBBU type PC, power-supply-voltage Vcc1 will be inputted into the control circuit 31 from the 1st interface control 4, and power-supply-voltage Vcc2 will be inputted from the 2nd interface control part 7.

Since the control circuit 31 outputs power-supply-voltage Vcc1 to the 1st additional circuit 5 as mentioned above at this time and the power supply voltage VccF is outputted to the functional block 2, the functional block 2 and the 1st additional circuit 5 will be in an active state, and the 2nd interface part 101 will be in a non-active state.

[0059] Thus, when data transfer is carried out in this embodiment between the functional block 2 and the 1st or 2nd interface part 100 and 101, Since the control circuit 31 which supplies electric power only to the mechanism block 2 the interface part side which performs data transfer was formed without supplying electric power to the interface part side which should be made the non-active state which does not perform data transfer, The data which should be transmitted can be made to transmit easily and certainly now, and the activity of an interface and non-activity can be changed [ rather than ] with easy composition using a multiplexer with complicated composition.

[0060] In the above-mentioned embodiment, when information processing equipment was connected to the both sides of the 1st and 2nd interface parts 100 and 101, had decided that the right to access was granted to the information processing equipment connected to the 1st interface part 100, but. May constitute so that the information processing equipment which is not restricted to this, of course, for example, is connected previously in time may have PC card 30 and a preference to access, and, It is easy to be natural even if a user changes connection arbitrarily even if a switching circuit as shown in a 2nd embodiment is provided and PC card 30 is connected to the both sides of portable PC and desktop type PC, and it enables it to perform data transfer to portable PC and desktop type PC by turns.

[0061] [A 4th embodiment of this invention] Next, the PC card by a 4th embodiment of this invention is explained using drawing 4. This embodiment explains in recent years taking the case of the PCMCIA ATA (AT Attachment) card currently widely used as an archive medium of a digital still camera or a personal digital assistant. Drawing 4 shows the outline composition of PC card 40 inside seen from the plane direction with two or more blocks.

[0062] In drawing 4, the 1st interface part 100 has the PCMCIA ATA interface 45 with the PC card physical layer interface 42. On the other hand, the 2nd interface part 101 has the USB physical layer interface 43, USB interface 44, and the IDE (Integrated Drive Electronics) interface 47. And these 1st and 2nd interface parts 100 and 101 are connected to the flash plate controller 46.

[0063] The common signal lines A which are data/address line among two or more signal wires A and B by which PC card physical layer interface 42 HE connection was made from the PCMCIA ATA interface 45 branch, and are connected also to USB interface 44. By connecting with the USB port of desktop type PC via the USB physical layer interface 43 and a connecting cable from USB interface 44, desktop type PC can access now PC card (PCMCIA ATA card) 40.

[0064]As shown in drawing 4, the flash memory 41-1, 41-2, and 41-3 are provided in PC card 40. These flash memories 41-1, 41-2, and 41-3 are connected to the flash plate controller 46 formed between the flash memory 41-3, and the PCMCIA ATA interface 45 and IDE interface 47 with the controlling signal line C. The USB line driver / receiver 44-1, the IDE command decoder 44-2, and the IDE host interface 44-3 are formed in USB interface 44.

[0065]A driver/receiver is formed in the PCMCIA ATA interface 45, and the non-common signal lines B which are not shared with the common signal lines A shared with IDE interface 44-3 among the signal wires from the PC card physical layer interface 42 are connected. The flash plate controller 46 functions as a PC card interface, The input signal inputted into the common signal lines A and the non-common signal lines B is decoded, Based on the decoded input signal, perform processing to the flash memory 41-1 to 41-3 via the controlling signal line C, or, The control signal transmitted via the common signal lines A based on the decoded result by the IDE command decoder 44-2 performs processing to the flash memory 41-1 to 41-3. Here, the signal wire of USB interface 44 is explained using Table 2. As shown in Table 2, as for the signal wire of USB interface 44, a total of power-supply-voltage Vcc=5V, signal wire for data D+ of a differential, D-, and four earthing conductors is provided. The USB physical layer interface 43 of PC card 40 has two connection ports for serial connection with other peripheral equipment.

[0066]

[Table 2]

V B u s	公称 5 V
D +	データ ( + )
D -	データ ( - )
G N D	g r o u n d

表 2 U S B インタフェース信号線仕様

[0067]If this PC card 40 is inserted in the slot of the PC card drive equipment of portable PC, a control signal will be transmitted via the PC card physical layer interface 42. The control signal shared with the IDE host interface 44-3 among this control signal is sent out to the common signal lines A, and the control signal which is not shared is sent out to the non-common signal lines B. The control signal sent out to the common signal lines A and the non-common signal lines B is decoded by the flash plate controller 46 via the PCMCIA ATA interface 45, and processing according to the decoded control signal is performed in the flash memory 41-1 to 41-3. The data in the flash memory 41-1 to 41-3 obtained as a result of processing is transmitted to the PCMCIA ATA interface 45 from the flash plate controller 46, and is sent out to portable PC via the PC card physical layer interface 42. Thus, PC card 40 can be operated as a PCMCIA ATA card.

[0068]On the other hand, when the connector of the USB connecting cable connected to the USB port of desktop type PC and the USB physical layer interface 43 of PC card 40 are connected, The control signal (serial signal) from desktop type PC is inputted, it is received by the receiver of a USB line driver / receiver 44-1, and, subsequently serial/parallel conversion of a control signal is performed.

[0069]The control signal changed into the parallel signal is decoded by the IDE command decoder 44-2, and is outputted to the common signal lines A via the IDE host interface 44-3. The control signal outputted to the common signal lines A is transmitted to the flash plate controller 46 via IDE interface 47, and predetermined processing is performed to the flash memory 41-1 to 41-3. It can be made to operate by operation explained above as an IDE drive by which PC card 40 was connected to the USB port of desktop type PC now.

[0070]Also in PC card 40 by this embodiment, the connection with information processing equipment can also make connection by radio including infrared ray communication, and it is also possible to acquire a power source wire from the connecting cable of the keyboard of desktop type PC. Although it explained by the case where the 2nd interface part 101 supports the USB standard, in the PC card by the above 1st thru/or a 4th embodiment, For example, if desktop type PC has the interface and connector corresponding to an IEEE1394 standard, It is easy to be natural even if it makes the 2nd interface part 101 of PC cards 1, 20, 30, and 40 of the above-mentioned embodiment the interface corresponding to an IEEE1394 standard.



## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is a figure showing the composition of the outline of the PC card by a 1st embodiment of this invention.

[Drawing 2] It is a figure showing the composition of the outline of the PC card by a 2nd embodiment of this invention.

[Drawing 3] It is a figure showing the composition of the outline of the PC card by a 3rd embodiment of this invention.

[Drawing 4] It is a figure showing the composition of the outline of the PC card by a 4th embodiment of this invention.

[Explanations of letters or numerals]

1, 20, 30, 40 PC cards

2 Functional block

3 and 42 1st physical layer interface (PC card physical layer interface)

4 The 1st interface control part (PC card interface)

5 The 1st additional circuit

6 The 2nd physical layer interface

7 The 2nd interface control part

8 The 2nd additional circuit

10 Desktop type PC

11 Connecting cable

21 Multiplexer

23 Switch

24 Logic for bus selector control

31 Control circuit

41-1-41-3 Flash memory

43 USB physical layer interface

44 USB interface

45 PCMCIA ATA interface

46 Flash plate controller

47 IDE interface

100 The 1st interface part

101 The 2nd interface part

102 and 104 A signal wire

106 Common signal lines

108 The 1st signal wire

110 The 2nd signal wire

112 A tee

118 A switching button

120 and 124 A power source wire